VOLUME XCVII NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1950

Sixty-four Pages of Illustrations in Color

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

$5.00 A YEAR 50c THE COPY

Vol. XCVII, No. 4 WASHINGTON April, 1950

THE NATIONAL GEOGRAPHIC MAGAZINE

Speaking of Spain

By Luis Marden

With Illustrations from Photographs by the Author

"ALL SPANIARDS," the saying goes, "have in them a little of Quixote, something of the poet, and a good deal of the bullfighter."

But first and last, the Spaniard is an individualist. The philosopher Miguel de Unamuno wrote of his countrymen: "It is difficult to govern a nation of 22 million kings"—and now there are 28 million of them.

Through more than a decade of travel through the countries of Spanish America for the National Geographic Magazine, I came to know the offspring pretty intimately, but always I was curious about the mother country. When finally I went there, I was impressed by Spain's people even more than by the rugged beauty of the mountainous peninsula.

My introduction to the country was typical. I had driven from Paris through southern France to the international bridge at Hendaye. French officials told me that the day was a Spanish holiday, but they let me walk across the bridge into Irún.

On the Spanish side, a Civil Guard in a shiny patent-leather three-cornered hat and yellow Sam Browne belt took me to the customs inspector, who told me he had no permits for me to enter with my photographic equipment and car of French registry. The representative of the Spanish State Tourist Department, who had my papers, was in San Sebastián with his family.

I said I would wait in France until the next day, but the customs inspector would not hear of it.

"If you don't mind," he said, "wait a little longer. If Don Cecilio does not return with the papers, come over with your car anyway. I think you would like to stay in San Sebastián, which is only 11 miles away; you will be more comfortable there. We will permit you to drive to San Sebastián to spend the night, if you promise to return in the morning to go through customs."

The assumption that everyone will respect a gentleman's agreement, and that a man's word is inviolable, is typically Spanish.

Shortly after our talk, Don Cecilio arrived at the bridge. Everything was put through in a few minutes; then all of us—Don Cecilio, the customs inspector, a captain of the Civil Guard, and I—went to a small bar near the international bridge and with wine of Jerez drank a toast to my first night in Spain.

That night Don Cecilio drove with me to San Sebastián. This fashionable watering place faces a horseshoe-shaped bay, the Concha. Here the late King of Spain had a lavish summer palace, and people of fashion come in season to be seen and to bask in the sun.

Spain Averages 2,000 Feet Above Sea

Late one evening I started on the 500-mile drive over the mountains to Madrid.

Spain has nearly every kind of topography and climate—snow-capped mountains, bare hills, fertile green farmlands, austere steppes, and subtropical southern coast plains. But the feeling of height and the cold, sharp air of altitude predominate.

After Switzerland, Spain's tumbled terrain averages highest above sea level in Europe. The land has an average height of 2,000 feet, and nearly everywhere it rises directly from

Every Spaniard Loves Sea Food—and a Man with a Camera

Madrid's big central fish market near the Toledo Gate receives and distributes tons of sea products each morning. These turbot, highly esteemed on the table, often reach a weight of 30 to 40 pounds. Their smaller relative, the sole, is one of the world's finest food fishes. In America, where the edible sole does not occur, "sole" on a menu usually means another flatfish, the flounder.

the sea, rather than from a lofty central plateau, as in Switzerland.

The highroad of France that runs from the frontier to Madrid passes through the old cathedral city of Burgos. The night I was there a half-moon made the fretted stone bulk, its boss-studded spires flecked with black patches in the white light, loom more like a fortress than a church.

According to academicians, people of Burgos and Valladolid speak the purest Castilian. I found it necessary to reorient my Spanish in Spain. For example, the second person plural of verbs—the *vosotros* form—has disappeared from the common speech of Spanish America. I had to learn it all over again, and for some time felt self-conscious in the use of it. In Spanish-speaking America it is used only in sermons, Presidential proclamations and speeches, and the like.

Beyond Burgos the road ran among rolling hills, through villages of barred and shuttered stone houses. When I heard music and saw figures moving on a playing field in one village, I stopped to look. Villagers were dancing in pairs to the music of a clarinet, trumpet, and accordion.

When I asked one of the men what the occasion was, he looked at me in astonishment. As if one needed some special reason to dance!

Madrid Nearly in Exact Center

Madrid lies almost at the exact geographic center of the country. It stands at the northern end of the somber plateau of New Castile. The surrounding wind-swept and treeless plain,

Bulky Cork Bark Is Light Because More than Half of It Is Air

Sevilla workmen bale the spongy outer bark of the cork oak *Quercus suber*. Such oaks grow wild throughout Spain, and are stripped every nine to ten years during the summer months. Processors boil and scrape cork, then divide it into three to five grades, according to thickness and quality. Best grades make, among other things, bottle stoppers and fishing-rod handles.

and an altitude of 2,150 feet, highest of all European capitals, give this city of nearly a million and a half a harsh climate. Winters are cold and summers burningly hot.

I drove into Madrid in the dark hours of early morning, too tired to notice much of the sleeping city; but when I left my hotel later that day, I found myself in the center of a handsome "monumental city," with many public monuments and fountains, broad avenues, and elegantly ornate architecture. Even banks and insurance company buildings are topped by symbolic statuary and heroic-size quadrigae in the grand manner.

Under arching jets of water at the center of a circular plaza the goddess Cybele sits in a chariot drawn by lions (page 444). Close by, with its embrasured façade facing the Paseo del Prado boulevard, stands the Prado Museum.

As I wandered through the galleries, my head swam with the fabulous profusion of Velázquezes, El Grecos, Goyas, Murillos, Titians. Pictures that I had seen reproduced only in art books and in prints were here in their original beauty.

From the Cybele fountain the Calle de Alcalá, Madrid's principal street, runs straight to the square of the Puerta del Sol (page 450). Just beyond the Cybele, the Gran Vía, main shopping and theater thoroughfare, branches off from Alcalá, runs uphill to the Plaza del Callao, then tilts downward again; so that from this end on a clear day one can see in the distance the mountains of the Sierra de Guadarrama.

Drawn by Theodore F. Thistlethwaite and Irvin E. Alexander

Like a Stretched Bull's Hide Is the Outline of Mountainous Spain, Second Highest Country of Europe

Spain's average of 2,000 feet above sea level is exceeded only by Switzerland. Occupying six-sevenths of the pentagonal Iberian Peninsula, the country has such varied topography that it has been called "Land of the Unexpected." Abundant rains fall in the northern maritime Provinces, but most of Spain has a dry, sunny climate, with extremes of cold and heat, expressed in the old Spanish proverb, "Nine months of winter and three months of hell."

In winter, icy winds from the snow-covered Sierra blow across the open plain to whirl down the length of the Gran Vía. But in fine summer weather, swank cafés place tables on the sidewalk. Crowds jam these "terraces" at the apéritif hour before lunch or dinner.*

Cafés Are Streetside Offices, Clubs

Shops and offices close at 1 p.m. in Madrid, to reopen at 4. People begin to drift to the cafés about 1:30, and by 2 o'clock tables are at a premium.

Close to being all things to all men, the cafés combine club, office, forum, theater, and trysting place. Most employ a Buttons, a boy in bellhop uniform who runs errands for clients. He will buy a newspaper, get shoelaces, bring writing paper and pen and ink, make a telephone call, or climb five flights of stairs to deliver a message to a phoneless friend.

Habitual customers may sit for hours over one or two cups of coffee; no one, except shoeshine boys and sellers of lottery tickets and cigarettes, will disturb them.

There are 1,500 taverns and nearly a thousand cafés and bars in Madrid alone. Taverns form the humblest category; they are small, friendly places where customers stand at the

* See "Madrid Out-of-Doors," by Harriet Chalmers Adams, National Geographic Magazine, August, 1931.

counter to drink white wine or beer.

More pretentious are the bars, with tables and a more diverse selection of *tapas* (snacks), such as cold cuts, shrimp, clams, oysters, crabs, lobsters, goose barnacles, and fried squid.

Most elegant of the three, the cafés proper often are sumptuously furnished, with crystal chandeliers and period furniture. Some strive for originality; in one, live songbirds fly about and perch on branches behind the bar.

In Spain the apéritif means food as well as drink. People sip sherry, manzanilla, or beer while eating appetizers of all kinds.

Spaniards love sea food before meals. To see shellfish in its variety and abundance, one must go to one of the few places in Madrid that serve draught beer. Here the discarded shucks of boiled shrimp rise in ankle-deep pink drifts on the floor. Spaniards eat shrimp the year round and must consume hundreds of thousands of pounds annually.

Madrileños Must Be Home by 11 or Be Locked Out

At that hour night watchmen rap on Madrid doorjambs, warning householders they are about to lock up. Late-comers clap hands to summon the guard, who carries the apartment key in his leather vest. Some residents have their own passkeys (page 422).

As an old shellfish fan, I thought I was familiar with most of these sea products, but here I found some new ones. An enormous crab I saw weighed more than five pounds (page 440); the girl who sold them said they sometimes reach double that weight, and I could see why Galicians who catch these call them "oxen of the sea."

With a friend whom I had first met on the ship going from New York to Cherbourg, I went one night to the street called Echegaray. At 9 o'clock, cocktail hour in a country that dines from 10:30 to 11, narrow Echegaray Street is thronged with people. Almost every other door opens into a bar or tavern, many of which decorate their walls with brilliant bullfight posters or with regional scenes in colored tile.

Natives of Madrid Called "Cats"

Madrileños (natives of Madrid for some reason are also called *gatos*, "cats") progress slowly down Echegaray, stopping at every—well, nearly every—bar for a small glass of white wine. Most wineshops throw in a snack with the drink. This may be a fried shrimp, a bit of mountain ham, a miniature meat ball, or a hot sausage on a square of bread.

In one tavern we sat on high stools at upended wine casks for tables, watching the stream of customers. A man overheard us talking and said:

Like a City of the King Arthur Legends, Avila's Battlements Loom Through Early-morning Mist

Avila carefully preserves one of the world's finest medieval walled cities (page 432). Storks return each year to ever-growing untidy nests on its belfries and towers. The city stands on the bleak Castilian plain between two mountain ranges, from which wolves descend to raid sheep flocks grazing outside the walls.

As Regular as Sunday's Noon Mass in Córdoba Is the 1 o'Clock Shine Outside Church

Gabardine topcoats are standard in Spain. Many men throw them round the shoulders, cloak fashion, like two of these Córdobans. Some of these shine boys wear rope-soled sandals. Inflation has driven up the price of the shine, but it sells for less than five cents.

"What! An American come to write about Spain? Stupendous! Have a drink."

"Stupendous" currently describes everything in Madrid; it has become the favorite adjective of Spain.

White-aproned men behind the bar bustled about with sticks of white chalk thrust over one ear. When they set down the small glasses of white wine, they wrote the amount of pesetas on the counter before each customer. They did this for each round, then totted up the amount to be paid before wiping the bar clean with a damp rag.

Behind the bar stood a small slotted barrel, the *bote*. A client left a few *céntimos* for a tip. Before dropping them into the barrel, the barman cried, "Twenty for the bote!" and all his colleagues shouted in drawn-out unison, "Gra-c-i-a-s!"

Columbus an Ensign in Spain's Navy

Titles of nobility are still common in Spain; one meets counts regularly, marquesses occasionally, and once in a while a duke.

Names connected with the conquest and discovery of America are still alive here. I met the Viscountess of Ilúcan, a black-haired lady named Alicia Moctezuma, who is a direct descendant of the last emperor of Aztec Mexico. She closely resembles portraits of the monarch, even to a mole on the cheek.

The present-day Christopher Columbus, Duke of Veragua and Admiral of Castile, is a young ensign in the Spanish Navy.

"If you meet him, don't say I told you," said a friend; "but when he took his entrance examinations for the Naval Academy, he failed in only one subject—navigation."

Spaniards take their scholastic careers seriously; courses at city schools demand it. One man complained to me that his son had to study calculus at the age of 12.

When I was in Madrid, the streets, like volcanic earth, were in a constant state of unrest. Workmen tore up the cobblestone paving of whole blocks and squares at a time.

There is the story of the foreign visitor who, when asked how he liked the capital, replied, "It should be beautiful—when they finish it."

Most Madrileeo live in flats in multistoried apartment houses. On the street level, big double doors of wood or of iron grillwork open into an entryway where the concierge has his rooms.

The old custom of the night watch persists in Madrid. At about 11 every night, the watchman, who usually wears a brass-bound visored cap and carries a truncheon, walks along his block, rapping with his night stick on doorjambs as he goes. This warns the householders that locking-up time approaches (page 419).

When I walked for the first time on silent Madrid streets after midnight, I was startled to hear a smacking sound. The reports sounded like pistol shots in the still night air.

Rounding the corner, I saw a man impatiently clapping his palms together. Someone called "Coming!" and the night watchman, muffled to the throat against the chill, came running up. From a many-pocketed leather vest he selected one of a dozen big keys and unlocked the door.

Night owls usually tip the watchman who lets them in, even though each tenant contributes a monthly sum toward the man's salary. A few forehanded people carry their own passkeys, unless they live in an old building, in which case the huge iron keys are too bulky.

One must also summon the watchman to be let *out* of the building. When with a dozen people I left a party late one night, we had to thrust our hands through the grillwork of the locked front door to clap. Nearly a quarter of an hour passed before the watchman, who had taken refuge from the cold in a tavern near by, came out and heard us.

Traditionally, the night watchmen of Madrid come from Galicia. Mostly they are discreet, silent men who, though they see everything, see nothing.

Cloaks Are Coming Back

As the nights grew colder in Madrid, I began to see men wearing the *capa*, the typical cloak of Spain. Mostly older men wear them now, but people told me that more cloaks have appeared in Madrid in the last year or two.

One must know how to "carry the cloak," the Spaniards say, to wear it with grace and elegance. The best ones come from Seseña's shop, in Madrid. Made of fine woolen Béjar cloth, most modern cloaks are short, coming to slightly below the knees. Usually they are midnight blue or black, though occasionally one sees a high-collared "Goya" in brown or maroon.

When laid out flat, the capa forms a full circle. It is cut full so that the wearer may throw one edge, lined with velvet or fur, round his neck in cold weather.

Thus enveloped, a man is snugly warm, but as tightly confined as if rolled in a rug. I wonder how Spaniards of an earlier age drew their swords in a hurry.

I wanted to find out something about bulls and bullfighting, so I went to the suburb of

Kodachrome by Luis Marden

In La Mancha, Where Don Quixote Tilted at "Giants," Huge Mills Still Spin

Cervantes's mad knight imagined the whirling vanes were menacing arms. When he charged, the sails toppled him from his horse; hence the phrase for foolish enterprises, "tilting at windmills."

Fandom Roses, Carnations and Round Fans Are Some Signs that Life Is On in Seville

Woman's Gay Mallinery In Man's Old Hat

This Bride Decides Wears a Personal Ornament

On the Golden Sands of Seville's Ring, a Bull Prepares to Charge His Foes

Segovia's Romantic Alcazar, Fairytale Fancy, Makes Visiting a Castle in Spain

Andalusia's Olives and Olive Oil Travel Round the World

A Gypsy Girl and the Alhambra Embody the Beauty and Romance of Spain

Fuencarral to talk with José Roger, a retired matador with the ring name of "Valencia," who kept a bullfighting school.

In a small bullring on the grounds of Valencia's house, I watched serious-faced young men training for the dangerous profession. One of their number acted as the bull. With a pair of bull's horns held in the hands he charged the capes of his fellow students.

Pepe, the master, explained the difference between the magenta silk cape, which is held in both hands, and the scarlet serge *muleta*, usually used with only one hand in the final stage of the bullfight.

Pepe showed me how to hold the cape, with the elbows held away from the body and the wrists supple and natural, "dominating" the bull and taking him past the body with the cape, then twisting in the opposite direction to receive the bull's next charge (pages 426, 435).

Bullfighter Turns Fisherman

All this and more Pepe explained, until my friend Julio told him I was a trout fisherman. Then the killer of bulls became a killer of trout.

"Man!" Pepe said excitedly. "Lacking masters, I have had to teach myself to cast the fly. With an old rod and a piece of cord, I practice in this very ring. Tell me, do you fish the dry fly?"

From then on I could learn nothing more about bullfighting. When Pepe showed me his exquisitely embroidered "suits of lights," he said,

"See, here is where I have pulled out the gold and silver threads to make trout flies."

With regard to trout fishing, "Practically all the rivers in Spain north of Madrid contain trout," Pepe told me. "Madrid's water supply comes from the Lozoya, a good trout stream not far from here. The other day workmen opened a water main downtown and took out a fat trout about a foot and a half long."

For some reason, I had always thought of Spain mainly as a warm southern country. Actually, Madrid lies near the latitude of New York, and the northern coast of Spain almost coincides with the Maine-Canada boundary. This helps explain why trout and salmon rivers abound in Spain.

"We allow no netting of salmon or trout in this country," said Max R. Borrell, director of sports for the Spanish State Tourist Department. "On the other hand, we have about 5,000 rod-and-line professional fishermen on our rivers, who make their living by catching trout and salmon for market. Frequently the professionals catch 40 to 50 trout a day with the fly. We have a closed season, but no bag limits.

"Thousands of salmon are taken each year by sport and professional anglers. On the opening day of the 1949 season, a 35-pound salmon was caught in the Nansa River."

Salmon an Expensive Dish

Salmon in Spain, which are the Atlantic species (*Salmo salar*), identical with salmon of Scotland or Canada, may bring two to three dollars a pound in the Madrid market early in the season. Some anglers who come to Spain defray part of their expenses by selling their catch. Mr. Borrell added that broad-bill swordfish and giant bluefin tuna abound in the sea off Tangier and Tarifa.

I asked him about shooting in Spain.

"We have nine species that we list as big game—bear, wolf, ibex, chamois, red deer, fallow deer, roe deer, wild boar, and lynx.

"As to birds, it is not uncommon to shoot a hundred ducks or graylag geese in one day. One of our best shots, the Count of Teba, shot in one 5-month season 4,072 partridges."

In season, partridge, trout, and salmon commonly appear on the menu of Madrid restaurants. I asked how, in the face of these enormous bags, it was possible to maintain such an abundance of game.

"Spain is relatively little industrialized," said Mr. Borrell, "and therefore does not have the wide-spread river pollution of a heavy manufacturing country. We still have immense tracts of wild and desolate country. And then there are few hunters and fishermen compared with the total population."

In a booklet written by the English wildlife artist W. H. Riddell, I read of the extraordinary flights of waterfowl in the Marismas, the vast expanse of marshland at the mouth of the Guadalquivir River in southern Spain.

Riddell records that he saw a mass of ducks at rest in open water, ten ranks deep and nearly three miles long. He estimated that the flock contained thirty to forty thousand widgeon. These, with teal, mallard, and pintail, are the species most commonly seen in Spain.

Through the courtesy of Don Luis A. Bolin, Director General of the Tourist Department, I was invited to visit a fishing and shooting preserve in the Sierra de Gredos, a mountain range near Avila, where lives a rare wild goat, the Spanish ibex (*Capra pyrenaica*).

The state protects the ibex, which live high up in the snows of the Sierra. No hunter may go out without a keeper and trackers, who make sure he shoots only old males.

Can a Covered Wagon in Hell: You Have a Mortal Taxi

[illegible]

[illegible] a parent bird glided down on [illegible] a lizard or snake [illegible] gling from its red bea[illegible]

After feeding the young, the storks tilted their heads back and [illegible]

No More Kisses

[illegible]

[illegible] He pointed to a row of framed signs on the wall, each with a color [illegible] illustrating the [illegible] I described. I saw "Shrimp in a Fry[illegible] [illegible] Sausage [illegible] Bun" and then I saw a bright [illegible] [illegible] wall the legend *Kiss [illegible] — [illegible]*

[illegible]

"You will [illegible] [illegible]

The [illegible] Mari[illegible] [illegible] to Algeria to [illegible]

[illegible] example of the [illegible] walls 40 feet [illegible] and 10 feet thick were built in [illegible] taken from Roman [illegible]

[illegible] storks perched [illegible] and ever and

tered against the cars [illegible]. As I watched, the glow of the rising sun suffused far snow fields with pink, rose, then brightened to orange and through increasingly brilliant yellow, and the sun at last burst forth in a white light so dazzling [illegible] (page 451).

After breakfast we drove down to the river through [illegible] villages and hamlets centered about [illegible] small towns. Here the Tormes, a wide, clear mountain stream, flows between stony, rocky banks.

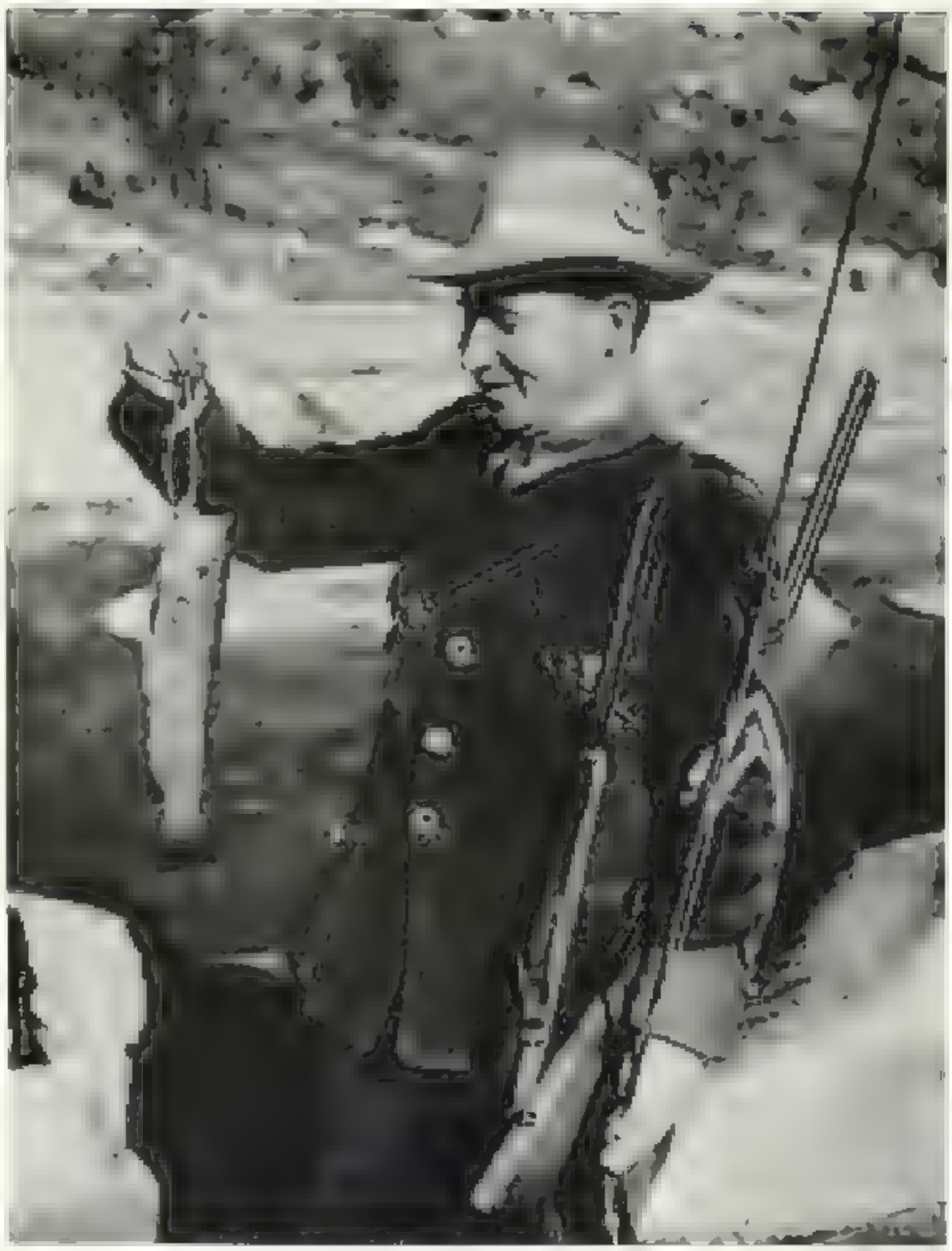
As the sun rose and warmed the [illegible] air we saw many brown trout in the river, suspended as if in green glass, dark olive shadows motionless except for a gently undulating tail.

It was early in the season for dry flies, and few came even to our hackles and wingless Spanish wet flies, which were [illegible] originated near León in the 15th century.

Our guest, Señor Pérez, sighed and said, "It is always the same: our trout are not very gallant with foreigners. They want to see a Spanish passport before they give themselves up."

Thirty feet above us in one pool I saw a trout rising [illegible] over a [illegible] gravel. [illegible] a small English dry fly floated over him, he turned his head [illegible] and waited [illegible]. Finally, as the fly floated over his nose for the fifth time, he slowly tilted upward and drifted downstream with it, looking it over carefully. Just as the fly almost reached our feet, he opened his mouth and gently sucked it in.

I gave him a second to swim away, then struck sharply. He came up solidly against a [illegible] and a half of [illegible] trout. When the gillie [illegible] him a few minutes later, he [illegible] on the side of the head. A male in perfect condition, the trout's vermilion spots glowed against the brownish [illegible] of his sides.



River Guard Smiles at a Trout, but Carries a Gun for Poachers

He [illegible]

Central Heating, Spanish Style

It grew cold that night in the mountains, and in the guesthouse I learned to use the [illegible] round table with a charcoal brazier under it. A long woolen cloth hangs to the floor, with slits that enable sitters to place their legs and even their hands inside.

From time to time [illegible] and stirs the glowing charcoal, a [illegible] fuel made of wood and carbonized olive pits. It

is a cozy way to sit on a cold night, particularly if one has an interesting partner to talk to.

One day I drove south from Madrid along the highroad that runs through La Mancha to Andalusia. Nine miles south of the capital, to the left of the road, a monument atop the Hill of the Angels marks the geographical center of the Iberian Peninsula.

This emphasized again the fact that Madrid is the navel of Spain. The town's central location probably helped influence Philip II in his decision to establish the capital there in 1561.

At Aranjuez, the bottle-green Tagus or Tajo, the river that empties into the sea at Lisbon (Lisboa), flows past the old Royal Palace that was originally built for Philip II in the same year he moved his capital to Madrid. Restaurants on the riverbank serve the famous asparagus and strawberries of the region, and rowboats and sight-seeing launches furrow the opaque green waters.

The Andalusia highroad climbs in sharp turns out of the green oasis of the Tagus Valley, into arid steppes again, and through La Guardia, a village formed almost entirely of cave dwellings. Rows of whitened doorways look out of sheer-off hillsides, and conical chimneys rise apparently out of solid ground, breathing spirals of smoke into the blue sky (page 448).

The Land of Don Quixote

Soon the road straightens and levels, to run in stretches straight as a map maker's rule through the level plains of La Mancha, a region that embraces parts of several Provinces. La Mancha—what images that name evokes! For here rode Don Quixote and his squire Sancho Panza.

The great classic of Spanish literature—"the best novel in the world," said Macaulay—has always been my favorite book. It is the most Spanish and one of the most universal books.

Since the publication of the first part in 1605, the masterwork of Miguel de Cervantes Saavedra has gone through more than 2,000 editions and printings.

Don Quixote and Sancho spoke many of Spain's pithy proverbs. Castilian has changed much less since Cervantes's day than has English since Elizabethan times, and Spaniards use proverbs almost unconsciously in their daily speech.

At Madridejos I saw my first Quixote windmills. The two stone towers' vanes were still, but later I saw them working, the white sails tracing a latticed arc against the cloudless sky.

The revolving arms of a working La Mancha windmill recall vividly the atmosphere of *Don Quixote*. The sails sweep round with a rushing beat of air, the wooden shaft and bearings creak and groan, and the ground thuds underfoot. One can almost hear, over the rhythmic menace of the vanes, the defiant shouts of Quixote as he charged the arm-waving giants, and the despairing cries of Sancho as his master was borne up on his lance and toppled from Rocinante (page 425).

With the dark-stocked miller I climbed to the work chamber of a mill.

"All travelers from Madrid stop to look at the mill," he said. "Most La Mancha windmills are in ruins; few working ones are left, because power-driven mills in the big towns make it unprofitable to run these."

The building trembled and shook to the powerful sweep of the arms that passed and repassed the small window in the thick walls, throwing the lean face of the miller into alternate shadow and light. The round millstones growled as they ground the barley between their jaws.

Suddenly a gaunt greyhound bounded up the spiral stone stairs, adding another Quixote touch to the scene, for in the opening sentence of the novel Cervantes says that Quixote kept a lance, a shield, a nag and a coursing greyhound.

Remembering the barber's brass basin that Don Quixote mistook for the magical golden helmet of Mambrino, I asked the miller whether such basins are still in use.

"Our barber doesn't use the old brass basin any longer," he said. "But they still employ them in some places.

"Have you heard the story of the barber and the walnut?" he continued. "Village barbers make the rounds every morning, and in fine weather they shave customers outside their own doors. This practitioner carried a walnut in his kit and gave it to the client to put in his cheek so that it would protrude and make it easier to give him a close shave."

Southward the road to Andalusia continues, through towns like Puerto Lápiche, also mentioned in *Don Quixote*, and it straightens again and points like an arrow across the fields to the church tower of Valdepeñas.

Grapevines Like Dry Soil

A vast web of vineyards surrounds Valdepeñas. Short grapevine stumps cover the plain with a network of regular rows that converge in the distance like tracks of a railway line.

Grapevines, like wine, do not like humidity, and they thrive in the loose, stony soil of La Mancha. Here they produce red and white Valdepeñas, the common table wine of Spain.

Shortly beyond Valdepeñas the flat country

Guy's Holiday Includes Things Picturesque, Man and Monuments Like These

[illegible]

and portable mule drawn in switchback bends and hairpin turns. Thus Down Dog Pass [illegible] to Arcabuen. At the crest of the pass the road runs along the edge of a [illegible] cliff above a small stream which [illegible] the railway line.

Where Don Quixote Did Penance

This is Sierra Morena, where Don Quixote did penance for love of Dulcinea del Toboso. Red-trunked cork oaks cling perilously to the base of fissured crags. Huge shoulders of schist, covered with patches of rust-red and cadmium-yellow lichens, rise sheer from the rocky stream bed. In these surroundings [illegible] land of cave-dwelling bandits, or a panto [illegible] Don Quixote turning somersaults for love [illegible] perfectly credible.

Descending from the [illegible] the road runs [illegible] to Bailén. Here during the Wars of Independence Spaniards won a decisive victory over Napoleon when they surprised 22,000 French [illegible] with a force less than half a [illegible].

The roads to Granada and Sevilla part at Bailén, and here the Government has built one of its comfortable parestbanes. These stand at strategic crossroads or halfway marks all over Spain, usually at points that would not otherwise afford good accommodations for the traveler.

At Bailén [illegible] shifts accents, from "lisped" Castilian to the oldfaint [illegible] Andalusia, a pronunciation more [illegible] like that of Spanish America. [illegible] accent does not become [illegible] deep Andalusian [illegible].

[illegible] road to [illegible] and Sevilla swings west at Bailén, but I continued south [illegible] to Jaén and Granada.

[illegible] to Jaén silver-green olive trees [illegible] the rolling hillsides. [illegible] the groves gave way temporarily to open fields where red-[illegible] buildings [illegible] the openings of iron oxide mines.

The mining riches of Spain seem inexhaustible. Wolfram, tungsten, manganese, [illegible] copper, lead, zinc, tin, mercury, and other ores. The Phoenicians found copper in Spain, and the Romans extracted what Pliny called "liquid silver from stones." Yet the mercury mine at Almaden remains the world's richest.

Jaén huddles at the foot of a dramatic

“I Can't Beat a Woman at Haggling—Take the Eggs at Your Price!”

[illegible] Mediterranean [illegible] Valencia and [illegible]. [illegible]

backdrop of mountains. High on the escarpment [illegible] stand the well preserved ruins of a Moorish [illegible]. [illegible] origin, Jaén today bustles with the prosperity brought by the olive groves that surround it.

Spain produces more olive oil than any other country, about half the world's total output. A fourth of all the olive oil of Spain comes from Jaén Province; then follow the Provinces of Córdoba and Seville.

With a representative of the olive growers' syndicate I toured the groves of Martos, near Jaén. Nine-tenths of all the cultivated land around Martos is planted to olives.

“More [illegible] trees [illegible],” said my companion. “[illegible] Jaén Province we have 2[illegible] olive trees.”

And [illegible]

When the olive crop is good, there is prosperity in the land; otherwise, everyone suffers.”

The olive harvest was over, but I saw the harvesting [illegible] olives [illegible] the trees [illegible] Martos [illegible] the [illegible] women gathered [illegible] (pages 428-429).

At [illegible] in a [illegible] Spain's total [illegible] “If you don't [illegible]”

[illegible]

[illegible] a small [illegible] bread [illegible] olive oil. He [illegible]

Olive oil, a superlative energy food, is rich in calories.

At the house of the proprietor of the olive grove I ate the regional dishes: *ortiga*, bread crumbs fried in olive oil; and a salad of orange slices seasoned in oil.

Presses Squeeze Oil from Olives

To see the oil extracted, I went to an *almazara*. At the entrance to this mill an enormous mass of blue-black olives rose to the height of the roof. Inside, a huge conical roller ground up the entire fruit, including the pit, into a black gruel.

Workmen then spread the heated paste on circular pieces of mats of esparto, a tough grass that grows in mountainous country, which is also used to make baskets, harness, rugs, and myriad other things. Threading the mat on the central column of a hydraulic press, they stacked others over it like a pile of flapjacks.

Already the man-high pile oozed oil, pressed out by its own weight; this oil and that from the first hydraulic pressing make the top-grade olive oil. The second and third pressings produce successively inferior grades of oil.

From the press the oil runs into a series of tile-lined vats. As it flows from vat to vat, water drains off at the bottom, and workers skim floating impurities off the top. The yellow-green olive oil, thus naturally settled and cleared, is known as virgin oil. Connoisseurs prefer this oil for cooking. Mechanical and chemical refinings later produce all stages of purity to the colorless, tasteless medicinal oil.

From Jaén the highroad continues through the mountains to Granada. On strategic high hills throughout this region stand square-sided stone towers. On these the Moors lighted signal fires to communicate from point to point.

Ruins and structures all over Spain record the passing of Romans, Visigoths, and 800 years of the Moors, all of whom have left their [illegible] the rich culture of the land.

[illegible] rows of terraces under the white line of the snows. Granada lies at the foot of the Sierra Nevada. Above the city, on an forest-clad hill, stands the Alhambra, the sprawling fortress-palace of the Moors. Completed in the 14th century, the Alhambra remained the stronghold of the African Moslems until the reconquest of Granada by Ferdinand and Isabella in 1492.*

At a time when nearly all Spain suffered from a severe drought, Granada was green and fresh with running water. The Moors built aqueducts and conduits to bring mountain spring water from the town of Alhama [illegible] the cisterns and fountains of the city, and the system still works.

The downtown business section of Granada is modern. But if one climbs the steep hill to the Alhambra and passes under an old arch into the dark woods, one enters another period in time. In the somber twilight under the trees, students bend over books on roadside benches and lovers walk hand in hand along the paths.

I entered the confines of the Alhambra through the great Justice Gate, a spearhead-shaped opening in the walls in the base of a massive tower.

In the spacious courtyard between the Moorish palace and the ugly unfinished Renaissance palace of Charles V, I saw groups of visitors, each with a guide intoning history in the language of his flock.

The Alhambra consists of a sprawling succession of rooms, porches, towers, galleries, and courtyards (pages 430, 442-3, 454). On the walls delicate calligraphy traced in stucco gives an air of fragility to the structure. From a huge barge stalactites of plaster. I found these oppressive in their sweet excess; in contrast to the light and airy feeling of the pierced windows and arches, the heavy treatment of the ceilings weighed me down.

A plaque marks the suite of rooms where Washington Irving lived while writing his *Alhambra*. It must have been a pleasant place to live and write, overlooking the gardens and the city far below.

Nightingales Sing in Alhambra Gardens

One night I looked down on Granada from the hill of the Alhambra. From the balustrade on which I leaned, the hill dropped sheer to the first tiers of houses on the upper levels of the city. At street corners old lamps on scrollwork brackets threw keystones of yellow light divided by a black cross of shadow on the whitewashed walls. The city lay quiet, so still that the songs of nightingales rose clearly in the night.

Here in the Alhambra gardens and woods I heard these European night singers for the first time. Their liquid song resembles that of our mockingbird, but seemed softer, sweeter, less metallic. It was spring when I was in Granada, and several nights I heard three or four amorous males singing at the same time.

The Alhambra looks across a ravine to the old hillside quarter called the Albaicin. In its narrow, steep streets, bougainvilleas blossom with

* See, in the National Geographic Magazine "On the Byways of Spain," March 1928, and "From Granada to Gibraltar: A Tour of Southern Spain," August 1924, both by Harry A. McBride.

pots of geraniums and carnations, and coppersmiths ply their trade (page 447).

In little plazas and at street intersections domed structures cover *aljibes*, the unusual underground water cisterns built by the Moors. Subterranean conduits bring fresh water to the system of cisterns, and people draw water up through a door in the cupola as from a well.

About 2,500 of Granada's 166,000 inhabitants are Gypsies. To see them one must climb still higher from the Albaicin on the road to the Sacro Monte. Here they live for the most part in whitewashed caves hollowed in the soft rock (page 446).

Gypsies have been in Spain so long that no one remembers exactly when they first appeared. By now their dark good looks, spit curls, flounced dresses, and abandoned dances have become part of the Spanish tradition.

Spanish Gypsies are a bold, insouciant lot. They speak with the familiar *tú* immediately on meeting one, and have a glib tongue.

"All Gypsies," they say, "are direct descendants of Jesus Christ, and for that reason we are privileged to live without having to work."

Out of the green valley of Granada and over mild hills I drove east toward the Mediterranean coast and Valencia. The automobilist in Spain must look out for big stones left on steep roads by carters. Drivers use the paving-block-sized stones for chocks when they stop their tandem mulecarts on a hill.

The road from Granada joins the main north-south Mediterranean coast highway at Puerto Lumbreras. Just before entering this town I stopped at a thatched shelter to watch women pack mounds of white eggs in straw for shipment to Valencia and Barcelona.

One countryman, wearing a black pleated smock and sitting cross-legged on full saddlebags, rode up (page 436). Eying my license plates, he asked, "French?"

I told him I came from the United States. Suddenly lapsing into English, he said, "I once spent four years in Ohio."

North along the coast the road runs through Murcia, center of a fertile plain criss-crossed with irrigation canals originally laid out by the Moors. Noted for its silk production since the Middle Ages, Murcia is the world center for silkworm gut, the filament used in fishing and for some surgical sutures.

To make gut, cultivists do not wait for the silkworm to spin its cocoon. They take the worm at the moment it prepares to spin, kill it and toughen it by immersion in a vinegar solution, then split it open and draw the two silk sacs out into threads 12 to 16 inches long.

Farther north I passed through Elche, with its forests of palms. Growers tie cloths around the palm fronds to keep them from the sun. The fronds, almost bereft of chlorophyll, remain a pale white for use on Palm Sunday.

Then comes the port of Alicante, and finally the flat *vega* (cultivated plain) of Valencia.

From Alicante north, people speak Valencian, a dialect of Catalan. Catalan has nine vowel sounds, including two *a*'s, three *e*'s, and two *o*'s.

For miles around Valencia the flat country is a succession of rice fields. Vivid green stalks project from blue water as far as one can see, and stooped workers standing knee-deep in water increase the similarity to an Oriental scene.

Close to the big seaport stretches the lagoon of Albufera, a large fresh-water lake. Separated from the sea by a narrow neck of land, Albufera is rich in fish life and aquatic birds. In season, duck shooting becomes a major occupation and pastime here.

Canals lead from the lake to villages and hamlets, and sailing boats with triangular sails appear to be sliding along on dry land when progressing across the flat landscape.

How to Catch Baby Eels

At Perellonet (the Valencian names sound strange after Castile), at one of the outlets to the sea controlled by sluice gates, I watched fishermen dip up *angulas* one night. Angulas are two- to three-inch elvers, the transparent young of eels.

The scene was like something from a Japanese print. Two wavering lines of light showed where fishermen, in boats with candle lanterns, scooped up the invisible elvers by making methodical sweeps with a long-meshed seine dip net.

Fishermen later throw them in water with a pinch of powdered tobacco.

"The nicotine kills them," one man told me. "Then we boil them for a minute or two and dry them between folded cloth."

Thus prepared, they look like bean sprouts or dry noodles. Restaurants fry them in olive oil seasoned with garlic and hot peppers.

Valencia is one of Spain's many gastronomic cases. Here one may get grilled cuttlefish, fried squid, and boiled Dublin prawns. But the great local specialties naturally center around rice, prepared in twenty ways. The *paella* leads all the rest. Paella, a meal in itself, is a noble dish of rice flavored with saffron and contains chicken, squid, mussels, clams, crayfish, prawns, and snails.

I had always thought I could hold up my end at table, but I found I was an object of concern to my Spanish friends.

Valentina's Festival Gowns Displays Golden Gown, Hair Skewers, and Sequined Lace Sleeves

Wineskin Drinkers Need Keen Eyes, Steady Hand and Pursed Lips

[illegible]

Spain's Five-pound "Pig of the Sea" Has Spreading Horrible Claws

[illegible]

The Granada Guide to Moslems Related to Christians, in Seville (c. [illegible])

Terms the Arabic Word for Red Gives the Name of the Alhambra

Beyond the Alhambra's Hill Stretch Sierra Nevada Snows

Around the Goddess Cybele's Fountain Charge Single Buses, Trolleys, Taxis and Pass to City of Madrid, Spain's Capital

Castanets Rattle and Bright Skirts Flare as Muscle Dancers Whirl to Singing and Guitar Music

Gilded Ebo Is Gaiters, the Moors Rule Again

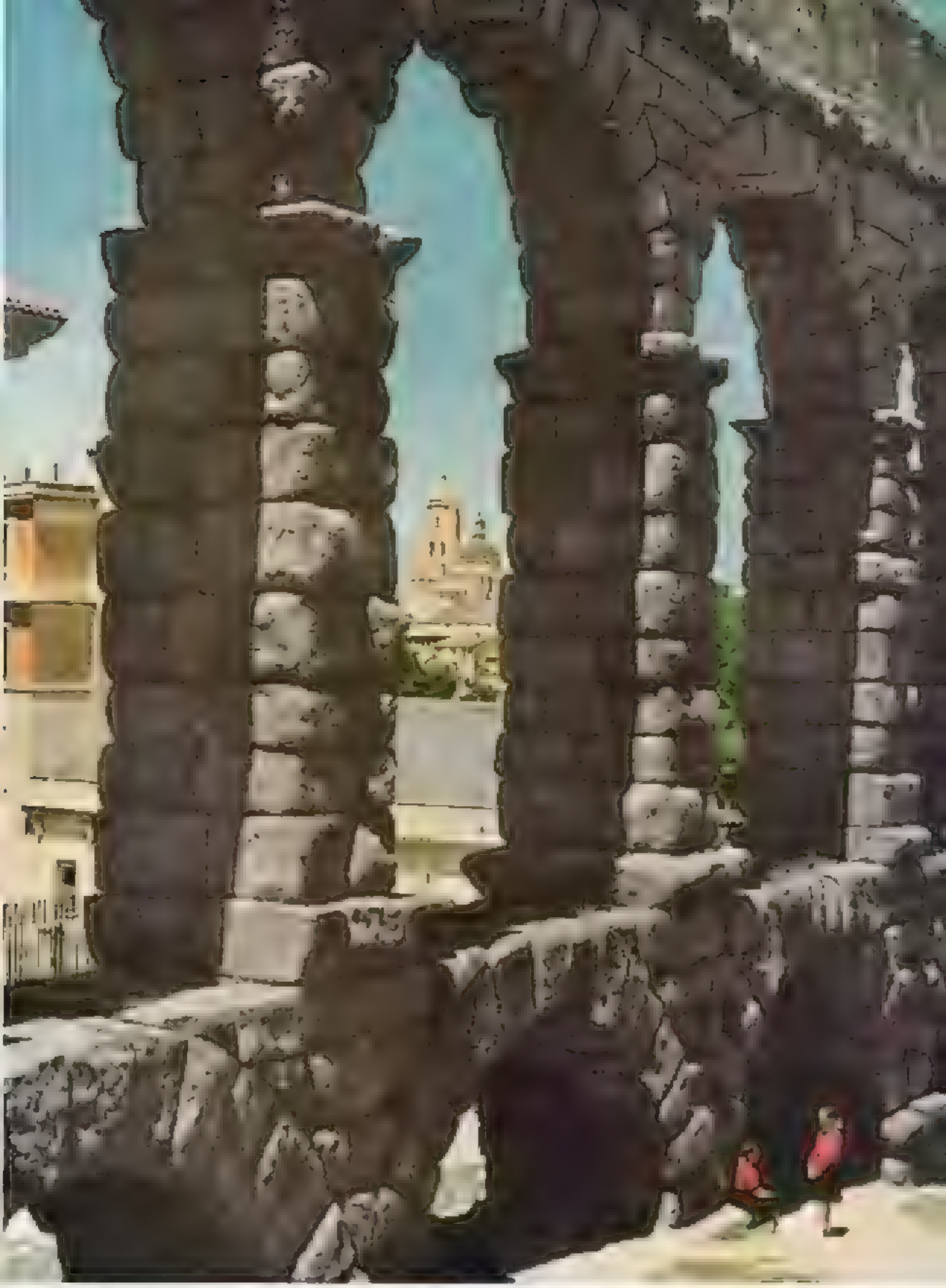
[illegible]

[illegible] Granada

[illegible]


1756

Earthen Homes of Cave Dwellers Stay Cool in Summer, Warm in Winter



Graceful Arches of Segovia's Roman Aqueduct Have Stood for 2[illegible] Centuries

[illegible]

Madrid's Busy Puerta del Sol, Heart of the Imposing Capital City, Symbolizes Spain's Vitality and Gaiety

Bass and Trout Lure in the Streams and Streamlets of the Gilboans, Sierra de Credos

Seville's Bitter Oranges, Source of Marmalade, Take Southern Sun to England and Scotland

Oranges and Good Looks: Two Valencia Specialties

His Three-cornered Hat Is Made of Patent Leather

Spain's Finest Example of Moorish Architecture Is the Alhambra's Court of the Lions

"You hardly eat enough to keep alive," they would say. "Eating is like scratching—it's all in getting started."

Valencia specializes in fireworks. So much is the city addicted to "artificial fires" that I could not be sure, when approaching Valencia by night, whether flashes beyond the horizon came from lightning of an approaching storm or from rocket explosions.

In the spring I returned to this third city of Spain for the celebrated *Fallas de San José* (St. Joseph). Festivities last for five days and center around elaborate humorous or allegorical life-size figures, in papier-mâché and wax, built on stages at street intersections.

The Valencians work all year to plan and build these fallas, or graphic satires; but all of them, big and little, go up in bonfires on the night of San José, March 19.

Men soak the paper, wax, and wood structures with gasoline, and in a moment the falla becomes a roaring conflagration. When I wondered aloud why the pavement beneath did not crack with the heat, friends told me that each falla rests on a layer of deep sand.

As the fallas burn, rockets scream upward from the roped-off central square to explode with window-shaking noise and brilliant colors. The noise builds up until, with the final salvo, everything shudders and quivers under the terrific impact of sound. Valencians love it.

"When our children are only two or three years old," a municipal official told me, "we take them in our arms and run with them under strings of exploding firecrackers, dodging the falling fire, so that the young ones will get used to it."

Bonfires at a Wedding

Fireworks and bonfires go with Valencians from medieval times. Many Valencians served in the army of Cesare Borgia, and on the occasion of the marriage of Cesare's sister Lucrezia to the son and heir of the Duke of Ferrara in 1501 the Valencians lighted bonfires in the plaza of St. Peter's in Rome.

Valencians display artistic talent in things other than fireworks. Here the first book printed in Spain appeared in 1474. The novelist Vicente Blasco Ibañez and the painter Joaquín Sorolla y Bastida were Valencians. And virtually every fine house in Spain possesses examples of the exquisite furniture turned out by Valencian cabinetmakers.

Center of the richest agricultural part of Spain, Valencia prides itself on its oranges, yet I found that local people prefer the thick-skinned navel oranges of California origin. Conversely, some Americans would rather eat Valencia oranges (page 453).

When I think of Spain, I like best to remember Madrid at Christmas and New Year's time. In the Plaza Mayor, the old enclosed Great Square, booths spring up then to sell holly and other Christmas greens. In this square lingers the flavor of *castizo* Madrid. "Castizo" is a difficult word to translate; it means "pure," "authentic," "traditional."

On one side of the Plaza, above the ponderous arched galleries and the uneven flagstones, rise twin spires that display two dials: on the left a clock, and on the right a huge barometer which always forecasts the weather correctly. The hand invariably points to "Variable."

At night an old woman sat under an arch roasting chestnuts, her face lighted ruddily by the charcoal brazier at her feet.

"How do you sell the chestnuts, señora?"

"A fat bitch apiece, sir."

A fat bitch is ten cents; a plain bitch only five.

Noisemaking on Christmas Eve

I bought some chestnuts and moved on. Under the gallery they were selling tambourines and drums, for Christmas Eve means a time of noisemaking in Madrid. I looked at one two-foot-wide tambourine covered with black script; the maker had used the vellum page of an old missal.

Streets surrounding the Plaza Mayor run on a lower level. From them the walls of the buildings forming the closed square rise like the ramparts of an ancient fortress.

To support the tremendous weight of stone the massive walls are thicker at the base, so that they lean inward from the sidewalk like the pylons of an Egyptian temple. Small, heavily barred windows pierce the forbidding façade, and a flight of worn steps, called the Cinderillas, leads upward through an arched entrance to the square.

As I watched, two men muffled to the chin in cloaks emerged from the darkness of the stairs and walked after their shadows in the yellow lamplight.

Farther down this street I looked through the misty window of Botín's restaurant at the pale smug faces of suckling pigs, nuzzling each other for a turn at the 200-year-old oven inside. All about me cooks crowed. Madriders were fattening them for the New Year.

On New Year's Eve I went with three friends to the Puerta del Sol (page 450). By a quarter to 12 it seemed that all Madrid had crowded into the square. People converged on Sol from side streets, and more surged up out of subway entrances. Some were beating

This Is Spain: a Granada Gypsy Dances in Her Cavern Home

[illegible]

[illegible] and [illegible] singing and dancing. [illegible] approached, the [illegible] [illegible]

We [illegible] way to the [illegible] [illegible]

[illegible]

[illegible]

[illegible] twelve [illegible]

[illegible] It was [illegible] midnight. [illegible]

[illegible]

[illegible] New Year. [illegible]

[illegible]

[illegible] "Yes."

[illegible]

I [illegible].

Arizona Sheep Trek

By Francis R. Line

With Illustrations from Photographs by the Author

I SHALL not soon forget the sight of Rosalio Lucero, the herder. His ravined brown face is a relief map of his Arizona hills. At more than threescore years his hair is still as black as the charcoal embers of his campfires, and his teeth are as white as bleached bones on the desert. Years of leaning on a herder's staff have sculptured his shoulders into the curve of the staff itself (page 474).

Rosalio dresses in dusty bib overalls and jumper, which flap grotesquely as he runs in pursuit of an errant sheep.

No, Rosalio does not remotely resemble a hero; yet twice a year he performs a hero's job, guiding his migrating herd across desert and mountains.

Heat and Snow Goad the Herd

By mid-April Arizona's Salt River Valley is beginning to scorch. For men there are excelsior and fan cooling systems, but for sheep, grazing in irrigated fields, the only air-conditioning lies in migration.

From 1,100-foot-high pastures around Phoenix the herds start trekking to cool summer pastures above 8,000 feet in the White Mountains, close to the New Mexico border (map, page 459).

For sheep and herders the annual trek means some 50 days of grueling struggle upward each spring, and an equally exhausting journey downward when autumn's snows drive them from the mountains. Climate's stern demands keep the herds trail bound more than a quarter of the year.

The migrants follow the Huber-Reno stock trail, a long, pathless strip two to four miles wide. Here and there the trail is so tangled that even experienced herders occasionally become lost (page 458).

Only a few weed-grown roads cross the trail along most of its length. For 50 days we touched no private property. Fences are 50 miles apart.

On the trail I was to see the seasons reversed within a week, ice succeeding summer's fiercest heat. Lizards sun-bathing in the desert gave way to deer bounding through shady forests. Cactuses dissolved into giant pines.

To take pictures of the trek, I appeared before sunrise one April 16 at the camp at the Paradise Stock Farm near Chandler, Arizona (page 460).

My gear was stowed aboard a burro (page 477). Our expedition's seven pack beasts were placed in charge of Pablo Chavez, a 42-year-old *compero*, who was to make our fires, cook our meals, and tend the burros for the next 52 days. Cheerful, Pablo had the strength to load and unload his seven recalcitrant burros four times a day, and the ability to shoe a horse or dress a wound.

As the herd poured out of the home pasture, its owner took a tally showing that Rosalio had 1,547 wards, including a few goats selected for leadership (page 477). All the sheep were ewes, freshly shorn. No rams made the trek on hoof; pampered males went by truck and railroad.

Into an unpaved highway the sheep flowed like a river of fleece. Soon 6,000 hoofs churned up a dust cloud which hung over the herd like a lazy balloon (page 463). Ahead and behind, more dust clouds identified other trekking herds.

Rosalio, who had to walk with the sheep [illegible] on the [illegible] cum all day long. By night he was coughing and exhausted.

Animal Bridge Spans Salt River

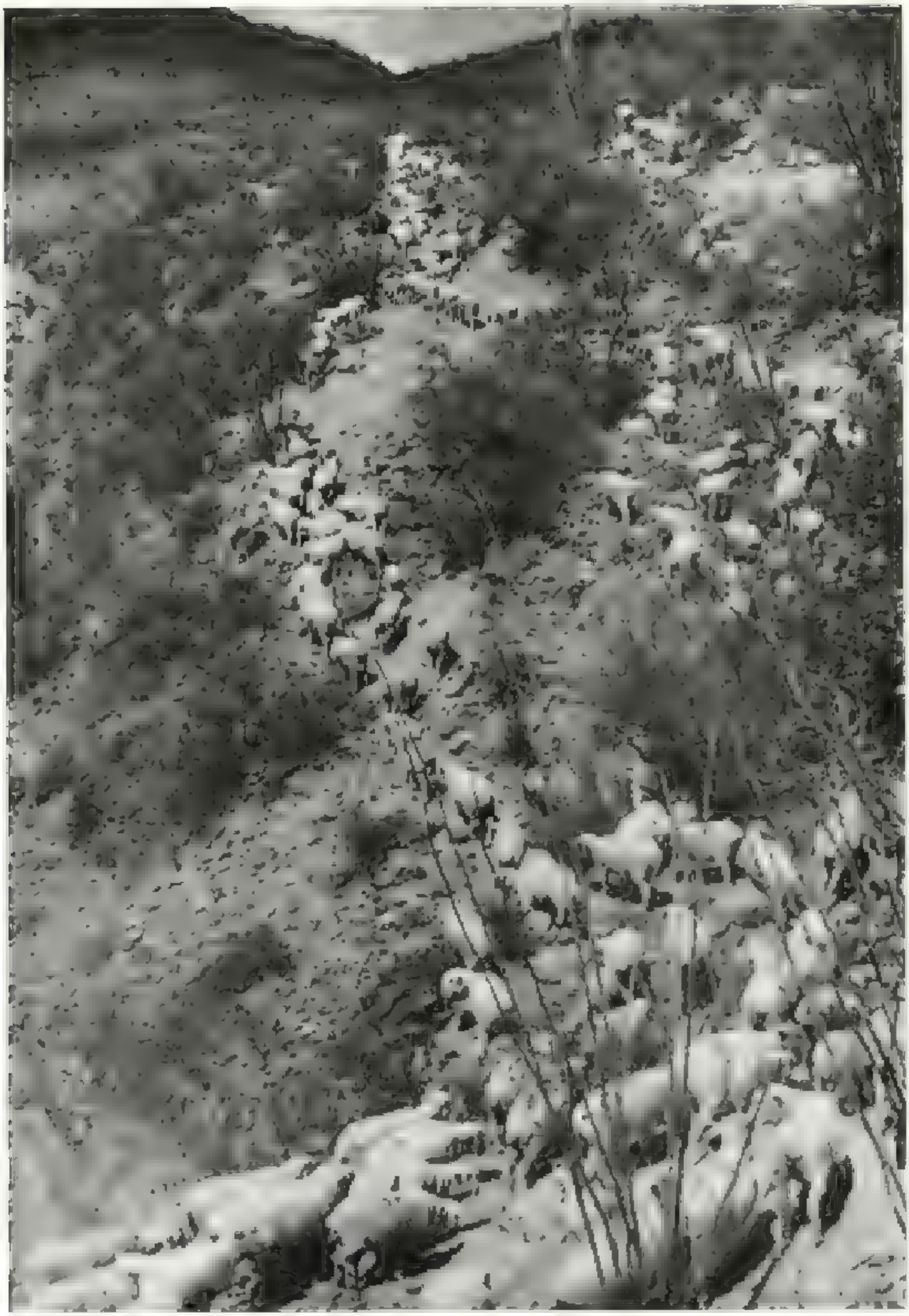
Our first stretch of desert, which we entered on the second day of the march, provided relief, for it was less dusty. That night we camped beside the Salt River and drifted to sleep on the tinkle of sheep bells.

In past years herds swam the river, losing occasional members; but we had the advantage of the sheep bridge, a narrow suspension span designed for stock (page 461).

When, on our third morning, the herd swung into a corral beside the bridge, Pablo laid out his camp and began cooking in restaurant quantities, for he had extra mouths to feed.

First of our guests were the herd owner, his wife, daughter, and son-in-law who drove in with canned goods for the herders and salt for the sheep.

Next, a Federal ranger arrived in pursuit of a census matter. As part of the sheep trail crosses the Tonto National Forest, for which the Forest Service charges a fee per head, the bridge provided an opportunity to count the herd as it streamed across. Now another outfit arrived with a herd encumbered with a mortgage. With it came a finance company's agent to tally his movable collateral.



One of Arizona's Longest Trails, the Abandoned Red Rock, Takes the Hiker Uphill

Drawn by Harry B. Miles and Ivan E. Johnson

The Sheep Trail Zigzags Across 200 Miles of Arizona Wilderness

Twice a year thousands of marauding ewes follow the Heber Reno stock trail. Each spring they quit the desert floor near Phoenix and seek cool pastures in the White Mountains. In autumn they retrace the course. Their "highway" is a narrow, patchwork strip of public domain and private range so tangled with canyons and mountains that herders often get lost. Rams travel by truck and train.

Literally, the bridge was a countinghouse. At noon we filled our plates with frijoles, mutton, and pan biscuits, and for an hour the men wove woolly yarns about the trail. This was the herders' last social fling for weeks.

Bridge Shakes; the Herd Stampedes

Promptly Rosalio opened a corral chute leading into the bridge. The herd leaders hesitated, but the impatient woolly mob stampeded them onward (page 476).

Shakily hung from cables, the bridge writhed and trembled, terrifying the sheep. Running, pushing, and bleating, they raced two abreast in a runway designed for single file. When they approached solid ground they leaped for joy, circus fashion (page 464). Burros showed fear of the vibrating span by freezing in their tracks. It took the herders half an hour to tug them across.

New good-byes filled the air; the herd was off into the wilderness.

We stopped at 9 that evening. Pablo hobbled the burros, opened the pack boxes, gathered wood, and lit a fire. Canned corn, frijoles, coffee, and paddy's remaining [illegible] made out meal. Sorghum syrup was dessert. Then we tossed the scraps to the dogs, Boots and George (page 474), and washed the dishes. With his flashlight Rosalio checked the herd, bedded down around camp.

It was 10:30 before we fell into our bed rolls.

Campfire lit a circle around us. A 40-foot saguaro cactus stood watch on our left.* Opposite it a scarlet headed ocotillo, one of the candlewoods, swayed in the breeze like a Hawaiian dancer.

All about us was silence, but not emptiness, solitude, but not loneliness. There was no noise or confusion. Civilization's worries [illegible]

A glance at the sky revealed the glory of the desert night. The stars, magnified by clear air, burned in brilliant array. By their light I could tell time and scribble notes. On other nights, by moonlight, I could actually read.

We arose at 5 for breakfast of pan bread, stewed fruit, and coffee. With the first gray light Rosalio and I started off with the herd, leaving Pablo to pack the burros.

Sunrise brought a cloud of gnats swirling blackly around the tender faces of the sheep. Half an hour of this torment stopped the herd. Each member buried her head in her neighbor's flank and refused to budge.

Rosalio shouted threats to no avail. Nor did it help when he [illegible] and even his blue jumper into the air. Finally he signaled his dogs into action. Then the mass of gnat pestered wool drifted a few hundred yards and halted again (page 465).

*See in the [illegible] "Saguaro, Cactus Camel of Arizona" by Forest Shaw, December 1935, and "Sentinels of the Desert," by L. L. Shantz, April 1937.

The Author Before His 52-day Ordeal

After the trek Mr. [illegible] the [illegible] [illegible] [illegible] the [illegible]

[illegible] [illegible] [illegible] [illegible] cactus [illegible]. The effect [illegible] proved a devil[illegible] [illegible].

Into the mass of clinging torture, too widespread to detour, the sheep crowded as if unaware of their danger. Suddenly one of the lead ewes, stung by spines, leaped into the air as if on springs. Landing on her companions, she tried to [illegible] across their [illegible]. A moment more the [illegible] [illegible] blindly shoved the leaders deep into the [illegible].

Despite my own caution, two [illegible] [illegible] me and [illegible] [illegible] me in the knee. Jumping cactus [illegible] [illegible] its name understood. When I moved, each po[illegible] [illegible] like a needle [illegible] in fire. Grasping [illegible] [illegible] [illegible], I jerked [illegible] [illegible] but not all. I [illegible] for a [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible].

For the sheep there was little we could [illegible]. In a few days their festering wounds expelled the spines with [illegible].

[illegible] [illegible] I saw Rosalio [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] the blazing plant [illegible] [illegible] every [illegible]. He hated [illegible] as he would a [illegible] enemy.

Now Rosalio [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] the most gorgeous and [illegible] [illegible] [illegible] of the entire trek.

Some cactus plants [illegible] [illegible] the [illegible] [illegible] fruit and blossom for [illegible] [illegible] [illegible] [illegible]. I have seen a [illegible] [illegible] [illegible] breaking and devouring the pulp of [illegible] [illegible].

Other cactus are [illegible] [illegible]. Among these [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] an opulent but wicked [illegible] [illegible] [illegible] [illegible] forest of [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] the [illegible] [illegible]. [illegible] [illegible] the

Next to hold [illegible] delayed the desert rocks — sharp, broken, rough, every [illegible] [illegible]. By morning of the third [illegible] [illegible] I felt them [illegible] through the [illegible] [illegible] soles. I was thankful that Rosalio [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible] [illegible].

Now the sheep, [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] in exhaustion. I was [illegible] worn out. By [illegible] my own [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] up with [illegible] [illegible] [illegible] was a welcome [illegible]

Pitching camp, we [illegible] up for the [illegible] of the day (page [illegible]).

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] restarted the trek.

Thirsty Herd Sprints for Water

Such was the pattern of our lives for the next [illegible] days. As we [illegible] the wilderness [illegible] into flower, [illegible] trees blossomed [illegible] sallow [illegible] put forth a bloom (page [illegible]).

Three days from the Salt River [illegible] Lake [illegible] [illegible] approached Rock Tank, the sheep had gone dry for another 72 hours. Thirsty and weary, they were barely plodding along when, half a mile [illegible] water. [illegible] the entire herd was stampeded [illegible] (page [illegible]). It was a joy to watch them. Like [illegible] [illegible].

As the tank was about two miles from a dirt road, the herd owner was able to meet us with [illegible] Water [illegible] daughter Adrienne, then 10 years old, who [illegible] with me that night under the stars (page 453).

A Sheep Owner Playfully Swings Out over Salt River

For a day the sheep rest beside the [illegible] the desert. Owners [illegible] a [illegible] (page 457). They [illegible] play. Here [illegible]

Adrienne was so thrilled that next [illegible] she wrote—

SHEEP

In my Arizona's great blue sky
On wending trails the sheep [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Two days of rambling took us to the top of Rons Pass, where we camped. Spread out for

miles before us lay Tonto Basin, one of America's wildest sections.

In the morning I let Rosalio go his way alone so that I might stay and photograph Pablo packing his seven burros.

Perhaps some herders are lazy, but not Pablo. Morning, noon, and evening he loaded or unloaded all the heavy kyack boxes, along with bedrolls, water kegs, shovels, and axes.

These packs carried virtually all the herders' personal possessions. Save for one vacation a year, they devoted their lives to the sheep.

Packing completed, Pablo fed his horse, unhobbled his burros, and set out to establish noon camp. We faced three days of tough going before we reached water at Tonto Creek (pages 469 and 471).

From Tonto Creek it was up, up into the foothills of the Sierra Ancha. For nine days we journeyed without sight of road, fence, or house.

Now the trail led us onto a tableland floored with dry flaree, paloverde, and isolated cactus. At a higher level greasewood shrubs atomized the air with fragrance. Atop a giant mesa we found a sprinkling of junipers. The altimeter of changing vegetation registered our ascent.

One morning lizards played hide-and-seek with me as I advanced. Startled grasshoppers, jumping ahead, measured my strides.

Heat Pursues the Caravan

As the sun climbed, so did the heat. Cupped between the Sierra Ancha ahead and the Mazatzals behind, our caldron boiled. At noon we found two thin paloverdes for shade. Burros, dogs, and humans, each sought relief in vain. Lying down, I exposed my shoe soles to the sun; I thought my feet would fry. We had no thermometer but the rising mercury of perspiration. Two days before it was 110° F. in the shade in Tonto Basin, and here it was hotter, with no shade.

Below our camp the sheep broke into tiny bands, each group sheltering behind a bush. It was 5:30 before Rosalio had the heart to start them moving.

As we were too hot and weary to carry canteens, I was surprised half an hour later to hear Rosalio ask, "You want a drink?"

Venturing into a darkening canyon, he led me to a small rock-lined pool. Lying on our bellies, we plunged our faces into the clear water. As I paused for a second drink, I caught the reflection of the dogs, drinking too.

Yellow jackets lit on the water, balanced themselves much like us, and dipped their heads. Their thick stems throbbed like pumps. We did not bother them, nor they us.

Thirst quenched, I discovered several thousand tiny eyes, shining like pinheads at the bottom of the pool.

Overtaking the herd, we encountered four rattlesnakes.

Woolly Army Routs Rattlesnakes

Behind the 6,000 hoofs of the herd, rattlesnakes were no danger whatever; they were dead or deep in hiding. But I often journeyed ahead, and so encountered many snakes; not once was I molested. Rosalio told me that in all his years no rattler had ever harmed him. To Pablo they were the "gentlemen" of the reptile tribe, always giving fair warning. He never went out of his way to kill one.

Occasionally we encountered sluggish, venomous Gila monsters. Tarantulas were common. Scorpions tried to camp in our blankets. By night sometimes Rosalio guarded the herd against marauding coyotes, mountain lions, and bears.

Three days out of Tonto Basin we entered Borego Canyon, a 200-foot-deep slash in a green-clad mountain. Scenting its isolated pools of water, the sheep scrambled into the gorge. "Baa! baa!" they bleated. Like the pipes of an organ, the canyon's red granite ribs gathered the sounds and tossed back echoes.

Amid this chorus, Rosalio detected a cry of distress.

"A sheep is stranded in the rocks," he said. "I go down."

I watched him, shoes in hand for surefootedness, as he made a perilous descent down shelving, slippery rock to a ledge where a silly, self-trapped ewe stood dismayed by fear of an 11-foot jump. Not until Rosalio reached the ledge did the sheep make a panic-stricken leap for freedom.

Lessons in Herding

Amid the canyons Rosalio gave us a lesson in herding. I marveled at how well he kept track of all his charges as they spread out into three or four ravines. As Rosalio could not trust his dogs to round up all the strays, he had to scour each ravine, searching behind every bush or bowlder. An uncanny ability to distinguish his animals' hoofprints from others helped this master tracker. In these wildlands, nevertheless, he must have walked four times the distance covered by his sheep.

Scarcely a day passed that Rosalio did not maneuver scattered brigades half a dozen times to hold his army together. Like a field general, he marched his forces out of difficult places with subtle moves.

I never ceased to wonder that Rosalio and Pablo got along so well. Other herders got

Sheep, Marching Across Arizona's Black Roads, Stir Dust Clouds

Earning Their Salt by Desert Grass, the Sheep Collect a Payment

Sheep Express Just at Quitting the Snake Salt River Bridge by Taking Grasshoppers Leaps to Solid Ground

Plagued by Gnats, the Sheep Bunch Up, Heads Down, in a Dry Wash. Rosalie and a Dog Start Them Moving

The Desert Sizzles. Pablo Pitches Tent for Noddy's Halt. Four Times a Day He Packs on Unpacks the Burros

In the Stray Desert Pablo Shoes His Horse Weekly

And Every Other Day He Bakes Pinebrown Biscuits

Through Weird Cactus Pitfalls the Caravan Cautiously Threads Its Way

[illegible]

A Desert's Road to Life-giving Water Is Paved with Bruising Cobbles

[illegible]

Rosario Stops Inside a Barrel Cactus Plucks Thorns from His Dog's Paw

[illegible]

Swelling Water: First Drank in Three Days, the Herd Stampedes. Woolly Piles Resemble Limestone Outcroppings

[illegible] Dry [illegible] Dry Drains Sip [illegible] Sip on [illegible] Creek

[illegible]

Herder and Helper Form a Living Gate and, Like Insurmountable Giant, the Sheep Leap by

[illegible]

Now Trail's End Dogs, Horses, and Sheep Cool Off in the Hick Jones's Shade — A Visitor Sees the Show

Pablo Quits the Comforts of Camp and Rides for Water

Roosevelt Is as Devoted to His Dogs as They Are Faithful to Him

on one another's nerves and quarreled, but never these two Spanish-Americans, who had worked as a team for years.

Rosalio [illegible] was to be asleep but seldom was there a meal at which he did not peel Pablo's potatoes or dry his dishes. Just as often Pablo helped Rosalio in the herd's emergencies.

At last out of desert and canyons, we stood on the summit of the Sierra Anchia. There we entered a new world. Manzanita shrubs wove a tangled glory atop the plateau. "Little apples of gold," Rosalio called the manzanita, because it bore a tiny fruit. It was blossom time, and each plant held clusters of unshaped fairy bells.

Rosalio, ever the herder, was unimpressed. "[illegible]," he admitted. "The sheep [illegible] not much. And it's too thick for them to get through."

We had paused to rest late one afternoon when the sky darkened and a shower set in. Pablo groped through the loads for a Spanish almanac. For this day, May 9, he read the Arizona forecast: "Dry, with rusty winds."

Rain Proves Almanac a Liar

We [illegible] May [illegible] this [illegible] pretty quick.

[illegible] for our bedrolls.

As darkness settled, Pablo and I hauled logs and built a campfire. Struck by raindrops, the embers hissed and swirls of tinted smoke billowed up.

We said "Buenos noches" early. The rain's tapping fingers beat a tattoo on our tent.

Morning was sodden and chilling, and the rain was heavier than ever. Rosalio could not afford to rest; his sheep needed fresh [illegible]. Taking his slicker and staff, he set out [illegible] the dismal dawn. Dripping trees and [illegible] rain swallowed herd and herder.

Pablo went out to hunt his belibied burros, while I stayed in camp to tend the fire. A [illegible] gust of wind rattled the tent, and the rain changed to hail. White, icy stones [illegible] the Dutch oven, hot over the fire, and burst into steam.

Pablo's burros deadlered into camp. Never had they appeared happy, but now each animal was a document of woe. Like silent monuments they stood, water dripping from each ear as from a trough. A donkey's ears are his only glory; now these had gone to half-mast. When rain and hail seemed unendurable, men swore, dogs whined, and sheep bleated. But burros stood silent, dripping.

Drenched and muddy, Rosalio returned, knelt by the fire, and scraped clay off his shoes. Lunch was a soggy affair.

By now the dog George was so chilled that he was shaking violently. When we retired for rest, Pablo covered George with a pack blanket and tucked him beside his own body.

Presently the flood broke the dams and ditches we had built to protect the tent. Rosalio and I repaired them. Hailstones, bouncing like rubber balls, popped beneath the tent flaps and melted. So exhausted were Pablo and the dog that their sleep was never troubled.

No matter how miserable, the dog did not neglect his duty. Though Rosalio did not give his customary whistle on leaving camp that afternoon, George, shivering but faithful, took his place behind the man.

Town 50 Miles from a Railroad

Our last soggy slab of pan bread was gone. From the tent I watched Pablo, swathed in his black slicker, his hat dripping, mud clinging to his shoes, mix his dough in the rain and bake it in the Dutch oven.

That night the storm blew itself out. Trek resumed in the morning.

Now the trail carried us into Pleasant Valley, and here I left the herd and visited Young, a ranchers' community of two stores, one church, one school, and some 500 people.

It would be difficult to imagine a more isolated community. Young is 50 miles from a railroad or a doctor. At the time of my visit it was connected with the world by one shaky telephone line.

Cut off as they are from the services of electricians, plumbers, and other artisans, the citizens have made up for the loss by developing a community spirit. I found them pitching in with hammers, saws, and paintbrushes to build a new wing to their church. With similar enterprise they equipped a lending library.

Leaving the comforts of town life, I caught up with the herd.

Sheep Hurdle Awesome Barriers

In our path stood Rancr Canyon, a mile-wide gorge strewn with twisted pines, ravines, and ridges. In places the underbrush was so thick that we could not see a dozen sheep out of the herd. Most of the time Rosalio had to run to keep track of his charges.

Next, the Mogollon Rim, a severe escarpment, rose like an exaggerated copy of the Hudson Palisades. As I looked ahead I wondered how the herd was going to surmount this long, tremendous barrier.

[illegible]

Sheep Stampede Across a Swaying Span

[illegible]

[illegible] [illegible] now Rosario had seldom used his [illegible] [illegible] dogs. He had run, chased the sheep and [illegible] them. But at the Rim he put the goats in the lead and turned the dogs among the herd. Reluctantly the seething mass began scaling the [illegible] [illegible].

Above the clatter of small hoofs Rosario [illegible] the cry of a lamb in distress. [illegible] [illegible] his steps, he found the animal wedged between two rocks. These would have been its [illegible] if the herder had let weariness [illegible] his compassion.

[illegible] [illegible] I saw the patient man stooping to give first aid to the injured, searching for the lost, and carrying the weak across [illegible]. His first act on reaching the top of the Rim was to [illegible] [illegible] [illegible] [illegible] and [illegible] a [illegible] drink for [illegible] days.

Once beyond the Rim we found ourselves near Heber, summer headquarters of several Salt River herd owners. In their corrals we held reunion with other newly arrived [illegible].

It had been a tough season, and tales of hard luck were many. We learned that one herder, lost in [illegible] Canyon, had wandered five days in delirium until a [illegible] [illegible] [illegible] [illegible] [illegible].

Another, bitten by a rattlesnake while climbing a ledge, had [illegible] [illegible] [illegible] to Heber. A [illegible] [illegible] [illegible] [illegible] of a sheepman. One [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] black [illegible].

Danger: Locoweed

One [illegible] danger [illegible] the [illegible]! Locoweed [illegible] [illegible]. This poisonous herb, if eaten, [illegible] the nervous system of livestock. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] the weed. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. Each day, therefore, Rosario scouted [illegible] [illegible] [illegible] [illegible] [illegible] site free of locoweed.

The trail swung into [illegible] [illegible] in [illegible] arc. We skirted Dry Lake near Snowflake and entered the Fort Apache Indian Reservation. Now we were at an elevation so lofty and cool that ice formed in our washbasin at night.

On June 3 we arrived at the home range, which lies in the White Mountains between McNary and Springerville.

For [illegible] [illegible] the sheep had [illegible] [illegible] [illegible]. Now they would [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] streams.

[illegible] [illegible] [illegible] to take the final tally was the herd owner. We [illegible] the trek

Sabu, a Wise Old Leader of the Herd, Thoughtfully Takes His Rest Sitting Down

[illegible]

Pablo's Melancholy Burros Drink Their Fill from Sycamore Creek

[illegible]

Mr. Arizona Hunter Pets His Pet Grizzly Bear Hound

[illegible]

[illegible] Roosevelt's Wears a Biblical Look

At that moment I was reminded of the twenty-third Psalm. For me, the trek had hypnotized that song of David written so [illegible]

[illegible]

He restoreth my [illegible] The [illegible] and the spiritual effect [illegible]

[illegible]

[illegible] Roosevelt's leadership had brought [illegible] changes through the [illegible]

[illegible] and The [illegible] Roosevelt with his crooked staff was the very picture of an Old Testament character.

[illegible]

[illegible]

[illegible] Roosevelt [illegible] with [illegible] Roosevelt [illegible] soldiers [illegible] dogs.

[illegible]

[illegible] 1917 [illegible] Roosevelt [illegible] 1917 [illegible] 62 [illegible]

[illegible]

* See "Among the Bethlehem Shepherds: A Visit to the Valley Which David Probably Recalled When He Wrote the Twenty-third Psalm," by [illegible] in [illegible]

Kew: The Commoners' Royal Garden

By Thomas Garner James

[illegible] National Geographic Photographer [illegible]

A MEMBER of the London Natural History Society reported the reaction of a Kensington sparrow to one of World War II's first air raids.

It fainted.

Having seen for myself the solicitude which Britain bestows on its tenderest wards, I can appreciate the outrage of her Nature lovers when a Nazi bomb blew the glass out of Kew Gardens' Temperate House, exposing to an English winter several thousand specimens of plants never meant to suffer such rudeness.

While we walked together through the Gardens, Kew's Director, Sir Edward [illegible] C.B.E., F.R.S., told me how Britain's wartime command had assured him priority for replacing the precious panes. Racing against both the war and the weather, the gardener-scientists saved 60 percent of the blast's victims.

Such stories illustrate what to me is the essential wonder of one of the world's great centers of research. The Royal Botanic Gardens at Kew, Commonwealth headquarters for plant study, clothe vast learning and vast economic importance in disarming garments of fragrance, color, bird music, and deep humanity.

Little Birds and Little Britons

Little birds and little Britons play delightedly around each other on Kew's green lawns beside unparalleled collections of plant exotics.

For an entrance fee of one penny, the visitor can see 45,000 different living species from every botanic beauty spot on the globe, and gain admittance to a university whose texts are flowers. No signs or permanent fencing tell him "Keep off." If all paths to learning were only as pleasant!

Nearly two million visitors pass through Kew's 288 acres of beauty annually. But even while they manifest a very personal pride in its loveliness, few of them realize how much they owe to the "green fingers" of the modest scientists working here. For Kew has given generations of Englishmen not only much pleasure and much instruction, but even their means of existence.

Almost unnoticed behind a garden hedge or a mellow brick wall are the seedbeds in which botany's "back room boys" have nurtured world-changing industries.

The bombs aimed at Kew's acres of glass revealed Axis campaigns to capture the cinchona and rubber plantations of the Far East. These great raw-material-producing industries, as do others in Europe's tropic colonies, hinge on Kew.

Kew in Lilac and Rhododendron Time

Come down to Kew in Lilac, or any other time. It is less than 10 miles west of London's City.

Although to Londoners the weeks of lilac and bluebell blossoms are the most popular, Kew presents her natural-history lessons at all seasons. The peacock butterflies of autumn and its chrysanthemums are as gorgeous as spring's tulips and magnolias or summer's rhododendrons (pages 483, 488, 494, 496, 497).

In the woodlands laid out by George II's Queen Caroline, an extraordinary variety of birds live throughout the year, feasting on Kew's fruits in autumn and at all times on crumbs brought them by human friends.

A special committee of the Ministry of Works publishes an annual report on the birds seen in Kew and in other of the royal parks.

The enormous Herbarium at Kew is the most famed of all world institutions devoted to taxonomy—the identification and classification of plants (pages 481, 501).

In its tiers of shelves, 6,000,000 sheets of plant specimens are preserved and grouped by classes, orders, families, genera, species, and varieties. Eighteen divisions of the globe provide a geographic cross index to the collection, which is particularly rich in type specimens.

The figure of 6,000,000 is a rough estimate, based on counts of sample sections, for no one knows the exact number.

"If I put one man to work on it," Sir Edward said, "I estimate that it would take him at least 42 years, Sundays off, to examine all the specimens of plants we have preserved in this building."

The pressed and fumigated plants are supplemented by special collections preserved in alcohol, by water-color representations, and by fruits and seeds.

[illegible] Laboratory has suggested a still more detailed method of classifying certain families and genera: by relationships revealed in microscopic study of sections cut from the specimens. Particularly useful in identifying timbers, this freez-

Subtropic Palms and Ferns in Jungle Profusion Soar under Glass of the Temperate House

[illegible]

Learned Members of the Royal Society Visit Kew's Herbarium

[illegible]

[illegible]

[illegible]

A Mecca of the Botanic World

[illegible]

[illegible]

From Kew's uniquely rich source material gathered by generations of collectors, the taxonomists prepare the great guides and compendiums of plant names and relationships which are Britain's monumental contribution to botanic knowledge.

Since 1841, when Sir William Hooker became Director, the plates and text for the *Botanical Magazine* have been prepared at Kew. This is probably the oldest botanical periodical of its kind still in continuous publication, for it was launched in 1787 by William Curtis, noted botanist of the Chelsea Physic Garden.

A Heritage of Charles Darwin

Made possible through a gift of Charles Darwin, the *Index Kewensis*, listing the names of all seed-bearing plants and the place of their first publication mention, was prepared at Kew and published in 1895. Every five years since then a supplement has brought up to date the knowledge added to the Herbarium's files.

From Kew's never-dry well of information also have come the *Floras*, which aim to systematize the plant identification for Commonwealth and Empire areas. These are exhaustive dictionaries. The *Flora of Tropical Africa* alone requires ten volumes to synopsize (more may be added), with another two volumes for the *Flora of West Tropical Africa*, and seven more volumes for *Flora Capensis*, or the Cape area. A new *Flora* is now in preparation at Kew for British East Africa.

The magnificent goal of the *Floras*— that anyone acquainted with the English language may, by these books, identify any plant found wild on Commonwealth soil"—is near to achievement. Britain itself, the West Indies, Hong Kong, Australia, New Zealand, former British India, Mauritius, and the Seychelles have now been covered, in addition to Africa.

[illegible]

No effective [illegible] work [illegible] on plants unless they can be accurately named."

Kew is their fingerprint file.

Most beautiful of all the treasures in Kew's Library are centuries-old flower paintings done by artists almost unknown outside this specialized field. Their accurate transfer to parchment of the colors and forms of flower specimens is a unique example of craftsmanship combining art with scientific training.

In the first rank of these botanical artists was Franz Andreas Bauer, an Austrian who settled at Kew in 1790 to paint flowers for George III. This plant-portrait master is buried in St. Anne's churchyard on Kew Green side by side with masters of human portraiture Johann Zoffany and Thomas Gainsborough. His brother Ferdinand was also a botanical artist (page 490).

If natural-color photography with permanent dyes could be perfected, botanists would have a new tool for plant identification, and the Herbarium's files, holding their mirror up to Nature, would doubtless include photographic plates and slides as well as the pressed specimens and water-color drawings.

Kew aims to assemble in one place the largest, most representative, and most efficiently indexed plant-identification material the world has yet seen.

Rolling Stones Out to Gather Moss

A special feature of Kew's Library is travel books, collected here because of their valuable references to plant ecology.

Trained to keep their eyes open, peripatetic botanists have been excellent travel reporters. Who has ever surpassed, for instance, the descriptive powers of John and William Bartram, father and son, the 18th-century Philadelphia gardeners who explored the fringes of the American Colonies? European writers from Wordsworth and Coleridge to Chateaubriand dipped deeply into William Bartram [illegible] for [illegible] of words.

John Bartram, as King's botanist, [illegible] New World explorer, [illegible] seeds back to His Majesty's superintendent of Kew Gardens. John alone introducing probably 200 new plants to English cultivators. Some of Britain's best-known garden flowers of today descend from these 18th-century colonists in reverse who brought back to the mother country the image of Pennsylvania hills or southern swamp.

Gardener-statesman Thomas Jefferson visited Kew on his trip to Britain; and Kew remembers his Lewis and Clark Expedition in the plant genera named *Clarkia* and *Lewisia*.

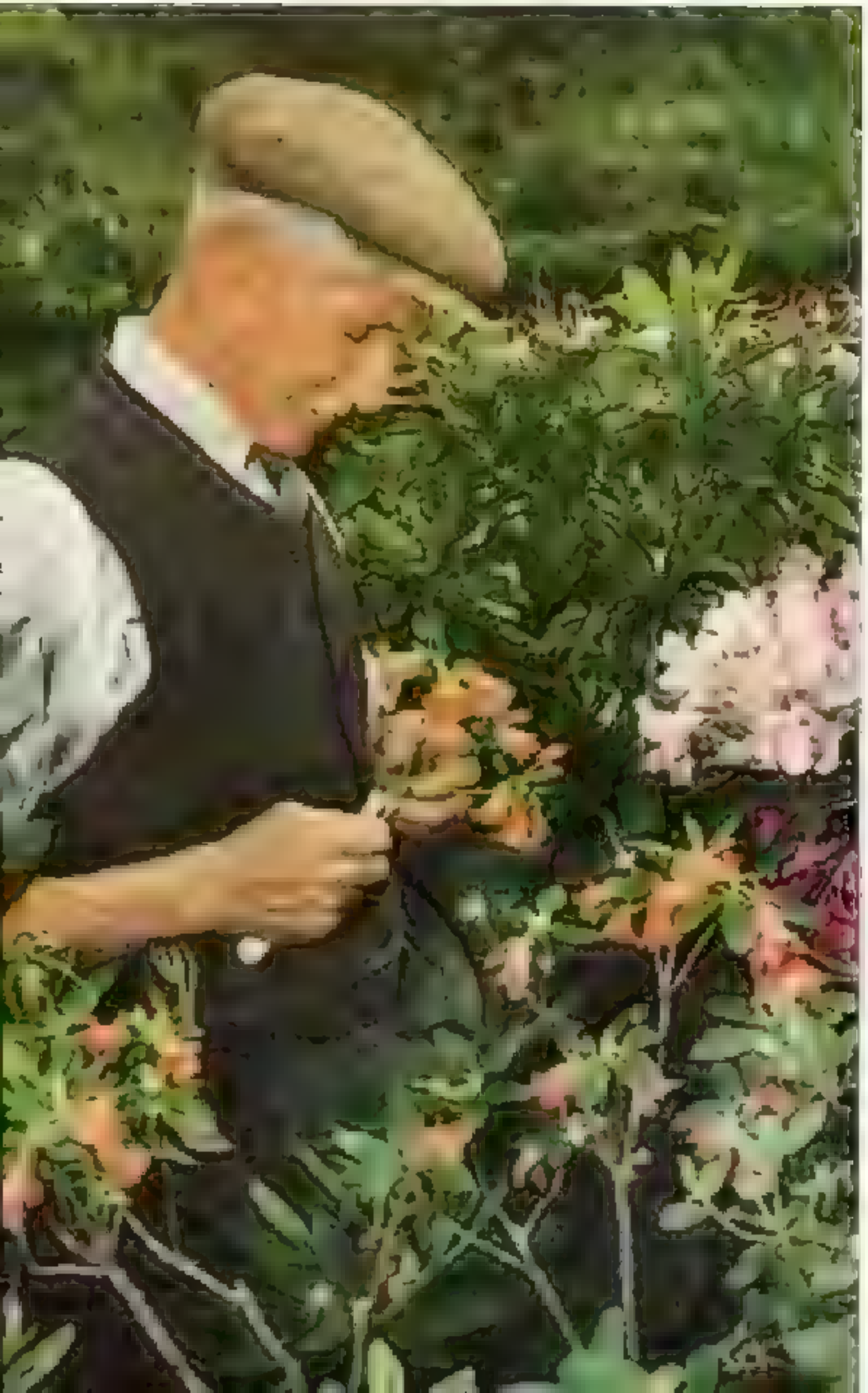
Kew's English landscape style, described by a late director as "suave and ample," is the last rose of the Georgian summer. Kew remains [illegible] in many respects as George III left it.

Sir William Chambers, Kew's royal architect, [illegible] today with landmarks he began constructing in the middle 1700's: the 163-foot Pagoda (page 500), still without a crack in its ten stories; the little Greek temples scattered about the Gardens; and the superb classic Orangery.

The Queen's Cottage, which George III's consort Charlotte used as a summer teahouse, is intact, knee-deep in beds of bluebells beneath its dusky yellow roof thatch.

Beauty and Scientific Interest Vie for Attention in London's Botanic Wonderland

Gatsby's Palm House, a 60-foot-tall Glass Masterpiece, Keeps Its Prize Orchids Alive as Rare Orchids Wilt Elsewhere. Bernard Kipen Profiles



Bloodhound on to Ivy, Keen's "Children" Get Hard Case

[illegible]

A Beaudet's Hobby

[illegible]

Flowers of All Seasons Spend Their Brilliance in the Ever-sparkling Conservatory

[illegible]

Fear with Pens — Their with Needle, Embroidery Students Copy Nature

An Apprentice Gardener Beds Tulips Among Dark Red Wallflowers

Pine Needle Clusters on Mountain Bonsais in the Rock Garden

[illegible]

What Could Be Finer than to Leave the Grass Green Bank and Stroll Beneath the Clematis-Covered Pergola?

* Kent Students Inspect Types of Books as Part of Their Library Course

[illegible]

* The Library Treasures Some Books Many of Them Priceless

[illegible]

A Blurred Banner Flutters Behind the Lesson, "Grow Your Own Greens"

[illegible]

The Fragrance of Geraniums Borne on Fragrant Spring Perfumes, a Balmy Sunday Morning, on the Pond

Lady Ashley's Beauty Is Only Skin-deep—It's Easily Struck

[illegible]

Smiles Bloom at Kew

[illegible]

Hybrid Lupines, Russell Lupine (Lupinus polyphyllus) from Kew's Seed Institute the Spectrum

[illegible]

A Rare Hybrid Is Featured in Kew's Glasshouse at the Royal Gardens

[illegible]

Carrie III Carnation and Globe Thistle Plants: Bred for Her Majesty Queen Elizabeth II

[illegible]

When Slender Tulips Splash The Gardens with Color, Lexington Knows Its Spring, the Broad Walk's Call Is Irresistible

Late in May, Lynn of Gale and Lazarance Greets Visitors to the Azalea Garden

A Rose Magnolia Glass and Roses Resemble Candles in a Store Window

Iris Petals Turn to Gold, Blue, Red, and Green in the Chemist's Beaker

Around it are the beech, chestnut, and oak woodlands where the birds sing.

Kew epitomizes even more than the history of English gardening. Outside London, few spots have seen so much of Britain's storied past as this riverside curve between Kew and Richmond bridges.

Julius Caesar's columns may have forded the Thames here in 54 B. C. In Syon House, facing a vista across the river from Kew, Henry VIII imprisoned Catherine Howard, and from Syon House Lady Jane Grey was carried by barge down to the Tower of London to be for nine days a queen before she died on Mary's scaffold.

Where Queen Elizabeth Walked

From the near-by Palace of Richmond, Queen Elizabeth liked to walk along the river path by Kew to the lawn marked now by the hollowed stump of a giant elm which was most probably her contemporary.

The present "Dutch House," or Kew Palace, in Kew, with the date 1631 showing over the door, then belonged to the estate of Lord Henry Capel, which John Evelyn described as having the "choicest fruit of any plantation in England." Since they lord red his royal parents' residence at Richmond Lodge, Frederick, Prince of Wales, son of George II, obtained a lease of the grounds from the Capel family in 1730.

The remarkable woman who conceived of Kew as a place where botanically interesting plants would be grown for the sake of the *plants* was Princess Augusta, Frederick's consort and mother of George III. In 1759, the same year the British Museum opened, Augusta started her living collections here on about nine acres of what is now the northeast corner of the Gardens.

Augusta's scientific adviser was the third Earl of Bute, who majored in botany while minoring in the relatively less important subject of court politics. Her head gardener, William Aiton, had been trained in Chelsea's [illegible] Garden belonging to the Apothecaries' Society.

The Reverend Stephen Hales, a founder of experimental physiology, designed the flues in the tanbark-heated greenhouse whose location is marked now by a giant wisteria.

Sir William Chambers, her architect, summed up in 1763 the miracle such men had wrought in Augusta's little garden:

"The gardens of Kew are not very large. Nor is their situation by any means advantageous: as it is low, and commands no prospects. Originally the ground was one continued dead flat: the soil was in general barren, and without either wood or water. With so many disadvantages it was hard easy to produce anything even tolerable in gardening; but princely munificence, guided by a director, equally skilled in cultivating the earth, and in the politer arts, overcame all difficulties. What was once a Desart is now an Eden."

The impress made by Augusta and her son George III on Kew still shows.

Kew Green is almost pure Georgian in tone, from the grassy cricket pitch standing out against the backdrop of St. Anne's Church to the onetime homes of royalty which fringe the green like a sunflower's petals.

George III's seven sons made almost a cricket team in themselves, his 13 living children requiring all the houses around the green for shelter.

Summering at Kew, Their Majesties rose at 6; and at 8 a procession of royal dukes from the respective houses converged to pay final respects. Once a week, George and Charlotte, "attended by the whole offspring in pairs," walked around the Gardens "admiring the works of Nature" and being admired in turn by the royal guests.

George III's Taste for Science

George III's taste for science made Kew—while still a private garden, albeit a royal one—a link which bound the tiny island of Britain to naturalists around the world.

Advised by Sir Joseph Banks (42 years a president of the Royal Society and circumnavigator of the globe on Captain Cook's first voyage *), His Majesty started similar botanic gardens in many of the colonies and sent out Kew-trained men to superintend them. Banks made Kew a depot for colonial interchange of plants.

And what crews of seed!

There was the Scot Francis Masson, Kew's first plant collector, who explored South Africa and then the Atlantic islands through the French wars. He was taken prisoner twice by French privateers, and finally succumbed to a Canadian winter while still collecting. (Page 494.)

And gardener David Nelson, accompanying Cook on his third voyage, and in 1787 sailing on Captain Bligh's *Bounty* with the mission of introducing breadfruit from the South Seas to the West Indies. Nelson lasted 4,000 miles of the voyage in Bligh's loyal but overburdened little launch before he perished on Timor.

* See "The Columbus of the Pacific (Cook)," in J. R. Hutchinson's NATIONAL GEOGRAPHIC MAGAZINE, January, 1937.

Forty Avenues Converge on the Pagoda

[illegible] Kew's "winter [illegible] George III's and [illegible] in 1820 and the [illegible] over by the nation in 1841.

[illegible] scientists remain [illegible] specimens in Darwin's record.

Darwin's Grandfather

[illegible] of 22 he sailed to the Antarctic with Sir James Clark Ross on the [illegible] Terror expedition. [illegible] while the two ships lay [illegible] Hooker sculpted [illegible] joined and [illegible] his companions [illegible] Nepal. [illegible] Hooker [illegible]

Charles Darwin, his lifelong friend wrote Hooker in 1862: "For long years I have looked up to you as the man whose opinion I have valued most on any scientific subject than anyone else in the world."

Hooker's encyclopedic knowledge of plant geography was the trellis against which Darwin shaped his theory of the origin of species.

In 1871 [illegible] the United States [illegible] Sumner [illegible] and reported up the [illegible] of the mountain regions of [illegible] Utah.

Portmanteau Greenhouses

[illegible] earlier [illegible] Hooker [illegible] the [illegible] which [illegible]

[1] See "Time and Tide [illegible] February, [illegible]

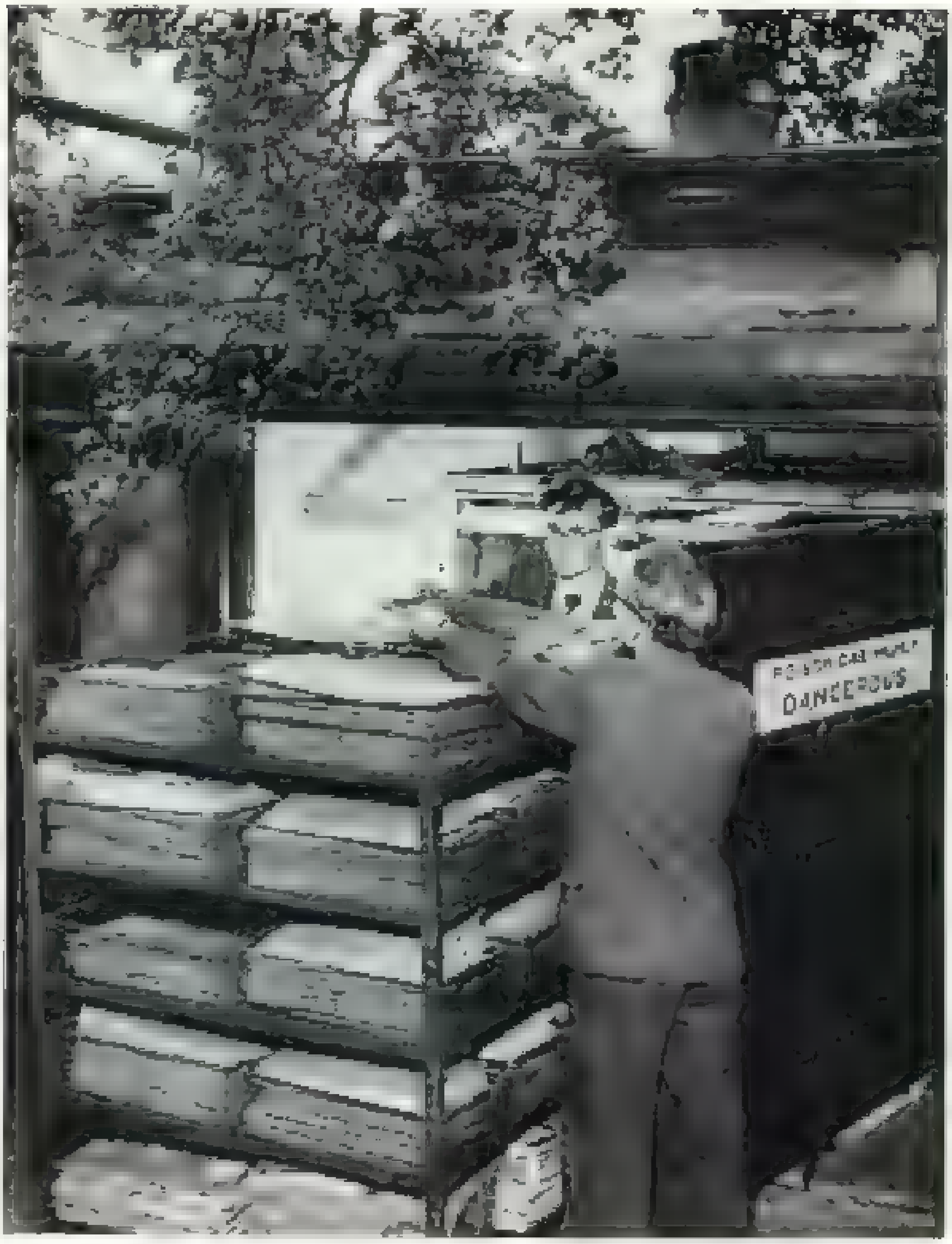
[2] See, in the [illegible] "Nepal: A Letter [illegible] to John Claude White [illegible]

the world through his well-loved Garden.

I had remembered seeing in London a 17th-century Apothecaries' [illegible] portrait of Nathaniel Bagshaw Ward, [illegible] [illegible] prepared [illegible] [illegible] Ward [illegible] Kew [illegible] has been of worldwide service to [illegible] the Wardian case.

The Wardian case is a traveling greenhouse about the size of a steamer trunk, in which many seedlings have traversed the Seven Seas as serenely as if they were in a church garden.

Medical practitioner Ward (1791-1868) was, like many Englishmen, interested in the mysteries of Nature. In the summer of 1829 he had buried the chrysalis of a sphinx moth in a glass jar partly filled with soil and lightly covered with a metal lid. He [illegible] to watch the emergence of the adult moth, but his interest [illegible] to the [illegible] grass [illegible].



Chemical Warfare Is Still Legal on the Insect Front

[illegible] plant specimens [illegible] [illegible] Insects and [illegible] [illegible] [illegible] furniture, also [illegible]

He lost interest in the moth itself because a fern and a grass had [illegible] soil and grown without attention or additional water for nearly four years—[illegible] have grown [illegible] of the metal lid on the jar had not rusted through.

Ward [illegible] upon the subject [illegible] for tender plants.

In 1842, years after Victoria had given Kew to the nation, he published his findings in a book, *On the Growth of Plants in Closely Glazed Cases.*

Constant experiment had convinced him that he could fill a case with palms and ferns which would not require rewatering [illegible] and they would be [illegible] immune to outside temperature changes or noxious gases.

The moisture evaporated from the soil and plants would condense again on the inside of the airtight case and run back down the glass to the roots.

Later [illegible], Ward [illegible] were quick to recognize the practical [illegible] for plant [illegible].

* Mr. [illegible] Kew [illegible] Dr. Joseph F. Rock [illegible] National Geographic Society expedition to [illegible] Province, China [illegible] National Geographic Magazine [illegible] by [illegible]

Smoke Invades Kew's Bright Green Land: Gardeners Wear the Stern Badge of Miners

[illegible]

The story of Kew's mastery of the Para rubber tree (*Hevea brasiliensis*) from its South American tropical rain forest home to the plantations of the Far East * is as fine an illustration [illegible] as a good picture to World War [illegible] Kew.

Rubber to Malaya

Many people probably know that Para rubber [illegible] Kew [illegible] Wickham [illegible] Kew had already introduced the cinchona [illegible] from the Andes into India [illegible] South America [illegible] Darling ground for Kew's industry.

[illegible] Robert Cross [illegible] South America [illegible] in the early 1870's was Henry Wickham, who [illegible] drawing [illegible] to Kew [illegible] the tree from which Brazil's rubber does [illegible] Sir Joseph Hooker [illegible] the tree as [illegible] and, [illegible] the India Office for [illegible] proposal to transfer the plant [illegible] Wickham [illegible]

[illegible] Kew [illegible] first consignment of healthy seedlings [illegible] 38 Wardian cases sent out to Ceylon [illegible] the nucleus of a Kew garden.

[illegible]

* See "Malaya, Treasure in Transit," by [illegible] National Geographic Magazine, [illegible]

A Bulletin Board, Program of the Changing Seasons, Lists the Plants in Bloom

[illegible] how to reach the [illegible] Water Lily [illegible]

more than $500,000,000 annually. This rubber also made possible the automobile industry of the United States.

Another venture of economic importance was an 18[illegible] transplant from Kew [illegible] carefully selected to grow in the volcanic [illegible] Ascension Island, an almost treeless [illegible] By 1865 the [illegible] "Through the spread of vegetation the water [illegible] and the garrison and [illegible] visiting the island are supplied with [illegible] of vegetables [illegible]."

In these [illegible] Kew has been blessed by Britain's geographic position as an island [illegible] plants [illegible].

In Kew's [illegible] have been transplanted [illegible] before [illegible] to the [illegible]

What is not [illegible] as important, Kew's [illegible] associated with the plant at the [illegible] stage. By the [illegible] Kew is able to [illegible]

Colonial agriculture [illegible] to Kew's plant experiments. Thus Kew [illegible] great [illegible] agricultural departments [illegible] plant types than they would ever [illegible] field [illegible].

[illegible] Kew, [illegible] plants have [illegible] in new areas, and [illegible] government [illegible] and other [illegible] work [illegible]

---

* See [illegible] National Geographic Magazine [illegible] by W. Robert Moore [illegible]

A Seed Banker Counts the Currency of Plant Life

[illegible]

[illegible] Britain for [illegible] rubber.

Primarily, [illegible], however, [illegible] Kew's scientific interests. [illegible] Kew [illegible] plants for their botanic interest generally rather than for the hope of profit.

Rescuing a Dinosaur's Companion

I was fascinated at Kew by the story of *Metasequoia*, or the rescue from the [illegible] of antiquity of a living link with the age of [illegible].

Metasequoia is a [illegible] name, [illegible] identifying a genus which, until World War II, botanists had known only as a fossil [illegible] the [illegible] of its last [illegible]. Kew [illegible] evidence [illegible] of their [illegible] [illegible]. Then the [illegible] *Metasequoia* was [illegible] to be lost except as [illegible] years.

new domestic plants [illegible] drugs [illegible] and spices, [illegible] gums, [illegible] and [illegible].

In East Africa [illegible] industry is developing new [illegible] from [illegible] and [illegible] plants, [illegible] and studied with the help of Kew.

In World War II Kew experimented with substitutes for [illegible] and [illegible] [illegible], both needed in the war effort. Some [illegible] from rose hips [illegible] British babies with the vitamin C which they could no longer get [illegible] imported oranges.

It seemed as if the plants were [illegible] out of that [illegible] by [illegible] explorers, [illegible] of *Metasequoia* seed.

Many [illegible] Arnold [illegible] for research [illegible]. The seeds [illegible] were [illegible] through [illegible] like Kew. [illegible] the [illegible] the [illegible].

I [illegible] members of Britain's Royal Society shake their heads in wonder [illegible] living fossil.

[illegible] *Metasequoia* was rescued in the nick of time. [illegible] Metcalfe told me that perhaps

[illegible] in the [illegible] civil war

[illegible] Kew [illegible] government [illegible] should [illegible] [illegible] Kew has helped cultivate

"Improvers" Are Aptly Named

[illegible]

[illegible]

Seedlings in a Cold Frame Suggest Chicks in an Incubator

[illegible]

[illegible] Kew [illegible] with New York.

[illegible] Kew [illegible] flowers from sixty-and [illegible]

[illegible] photographer Stewart [illegible] with the way [illegible] Kew [illegible] than [illegible] the [illegible]

[illegible] Kew [illegible] with [illegible]

Kew Packs a Wardian Case, Plant Lives Traveling Greenhouse, for Shipment Overseas

[illegible]

Voices of the Night

An Explorer with Microphone and Flashlight Finds in Jungle and Roadside Ponds Unexpected Beauty and Interest

By Arthur A. Allen

Professor of Ornithology at Cornell University

With Illustrations from Photographs by the Author

"THERE is some strange animal that sneaks through the jungle and watches us at work," said Dr. Eyring. "We hear the twigs snapping as it approaches, but it never comes close enough for us to see it.

"Each morning, when we are setting up our instruments, and again off and on during the day we hear it; but we have no idea how large it is. Perhaps it is a jaguar, perhaps only a curious native; but it gives us an eerie feeling to know we are being watched. Possibly you and Dr. Kellogg can identify and record it."

This was exactly the sort of problem that had brought us the invitation to join the Office of Scientific Research and Development project on jungle acoustics, and had taken us to Panama on the first leg of an expedition bound for the South Seas.

The engineers and physicists under Dr. Carl F. Eyring were assigned the job of measuring what happens to sound under all sorts of jungle conditions, and Dr. Paul Kellogg, associate professor of ornithology at Cornell, my son David, and I were responsible for recording and identifying the natural sounds that emanate from the jungle.

Here was our first challenge. For several weeks we had been recording the songs and calls of birds by day and the squeals and whistles and grunts of all kinds of animals at night. Recording bird voices was an old story to us, for we had been doing it in the States for years;* but to sneak through the jungle at night with a flashlight and a microphone was a different experience.

We had come to appreciate how our boys in New Guinea felt when they were encamped in the jungle and had to listen to the strange sounds which, for aught they knew, were emanating from Japs as often as from animals. Their experiences gave birth to the OSRD project upon which we were engaged.

The next day found us near Madden Field, in Panama, in response to Dr. Eyring's suggestion, where the engineers had cleared a long, narrow strip through the jungle and set up their instruments at either end. Kellogg and I scouted the area for animal signs and then sat down to listen.

In half an hour twigs began to crackle, and we could well have imagined an enemy sneaking up on us. I had taken my stand against a tree close to a tiny clearing and there, as the crackling sounds grew louder, I could see a small black-and-orange bird flitting from the side of one sapling to another close to the ground across the open space.

Sounds of a Courtship Dance

What Dr. Eyring had heard was the courtship dance of Gould's manakin. The twig snapping sound was made with the bird's swollen wing quills rubbing against each other as it flitted from one small tree to the next. This curious performance is described in Frank M. Chapman's book, *Life in an Air Castle*.

Not all of the jungle sounds were so easily identified. Some of the small birds, such as the green shrike vireos, that sang loudly from the lofty canopy of the jungle, though well recorded, remained unidentified for weeks. Some of the night sounds remain unknown to us even today, because we were unable to catch the insects that perpetrated them.

Many of the more satisfactory sounds were made by the tailless amphibians—i.e., frogs, toads, and tree frogs (page 514). They were satisfactory in that they could be tracked down with a flashlight, and the creatures didn't mind continuing their concerts in the beam of the light until they were captured.†

Even so, there were many surprises, such as the "cave frogs," which sang from little burrows in the mud at the edge of a pond and could not be found even when the flashlight was only inches from them.

One narrow-mouthed toad (*Gastrotheca pustulata*) sounded like a large animal in distress; but when we found him calling by a little pool in the jungle, he was scarcely an inch long and round as a marble.

* See, in the National Geographic Magazine, "Touring for Birds with Microphone and Color Camera," June, 1944, and "Hunting with a Microphone for Voices of Vanishing Birds," June, 1947, both by Dr. Allen.

† See "A Frog That Eats Bats and Snakes (Speaks Jungle Frog)," by Kenneth W. Cooper, National Geographic Magazine, May, 1948.

Puffed with Snuff is Cumaea, Lead Sits for a Roadside Portrait by the Author

[illegible]

[illegible]

racket of peepers and toads in northern ponds and to the summer chorus of green frogs and bullfrogs from the Lake shores, I was unprepared for the enormity of this southern chorus.

The different species had not awaited the coming of their appointed times as they do in the North, where water temperatures determine which species will perform. The warm April showers had brought them all out at once, and the effect was indescribable.

Returning from a lecture at Collegeboro we heard what we thought to be a flock of lost sheep well within the city. There, in a puddle, was an amazing aggregation of animals, which in the headlights of the car looked like a vast collection of ping-pong balls that momentarily appeared and disappeared.

The bleating chorus continued in the glare of the lights, and we soon discovered that the ping-pong balls were the snow-white inflated throats of a host of spadefoot toads (*Scaphiopus holbrooki*). Each inflation lasted only a second or two, during which time the toad emitted a loud blast.

Spadefoot toads are burrowing creatures that spend the day beneath sandy soil and come out at night to feed. Irregularly and [illegible] heavy rains, all the toads in [illegible] gather [illegible] ponds where the males start the breeding chorus so the females will know where they are expected to lay their eggs.

The eggs are laid in irregular strings and hatch within two days into tadpoles. Within two weeks and before the puddle has time to dry up, these transform into baby toads.

Spadefoots occur locally throughout the Southern States and as far north as Massachusetts, but their activities are unpredictable, since they breed any time, depending on the rains, between March and September.

We spent an interesting week in the vicinity of Collegeboro, with Dr. Malvina Trussell, professor of Biology at Georgia Teachers College, serving as guide. This precaution proved desirable, for whenever we heard an unfamiliar sound we would get out our flashlights and start across fields and fences to find the pond where the creature was singing. On the way back we sometimes found the landowner barring our return with a shotgun.

After locating and identifying the musician, we would drag the microphone, pre-amplifier, and cable to the spot. While Dr. Kellogg in the car adjusted the amplification and the cutting needle, I would hold the microphone within a foot or so of the singer.

After securing a good record of his voice, I would then catch him to make certain of our identification by daylight with the aid of Wright and Wright's frog book (page 513). This was imperative, for many of these creatures are chameleonlike in their color changes. One familiar with their appearance by day might easily confuse them at night.

Some Frogs Grow Paler When Singing

Many species of frogs are much paler when singing. The green tree frog (*Hyla cinerea*) becomes a golden yellow; the dark brown peeper (*Hyla crucifer*) appears a light tan, and the almost black bullfrog (*Rana catesbeiana*) may look like a blob of bronze putty as he lies inflated on the surface of the pool (pages 517, 518, and 521).

The brilliant green barking frog (*Hyla gratiosa*) usually changes to a deep brown when he gets ready to sing. During the day he may display a few gold specks on a bright-green background or small, brown doughnut-shaped spots; or he may become entirely olive brown, though not approaching his nocturnal shade (pages 511, 519).

In addition to the vocal sacs which are so conspicuous a part of the performance, the whole body is inflated during the song, so that a normally slender frog may appear almost spherical (page 514).

My first introduction to the squirrel tree frog (*Hyla squirella*) was at night near Gainesville, Florida. Attracted by a duck-like quacking, I waded along the edge of a pond with my flashlight swinging in the direction of the sound. Finally the beam reflected from a large grayish-white bubble, behind which was an almost circular brownish body about an inch in diameter (page 517).

The next morning the jar in which I had put the curious apparition contained a beautifully slender, brilliant green tree frog, so different from the one I had captured the night before that I could hardly believe my eyes.

This tree frog derives its name from its habit of climbing into trees after the breeding season, where at the approach of rain a number of them often call in chorus. Then they sound more like barking gray squirrels than like quacking ducks.

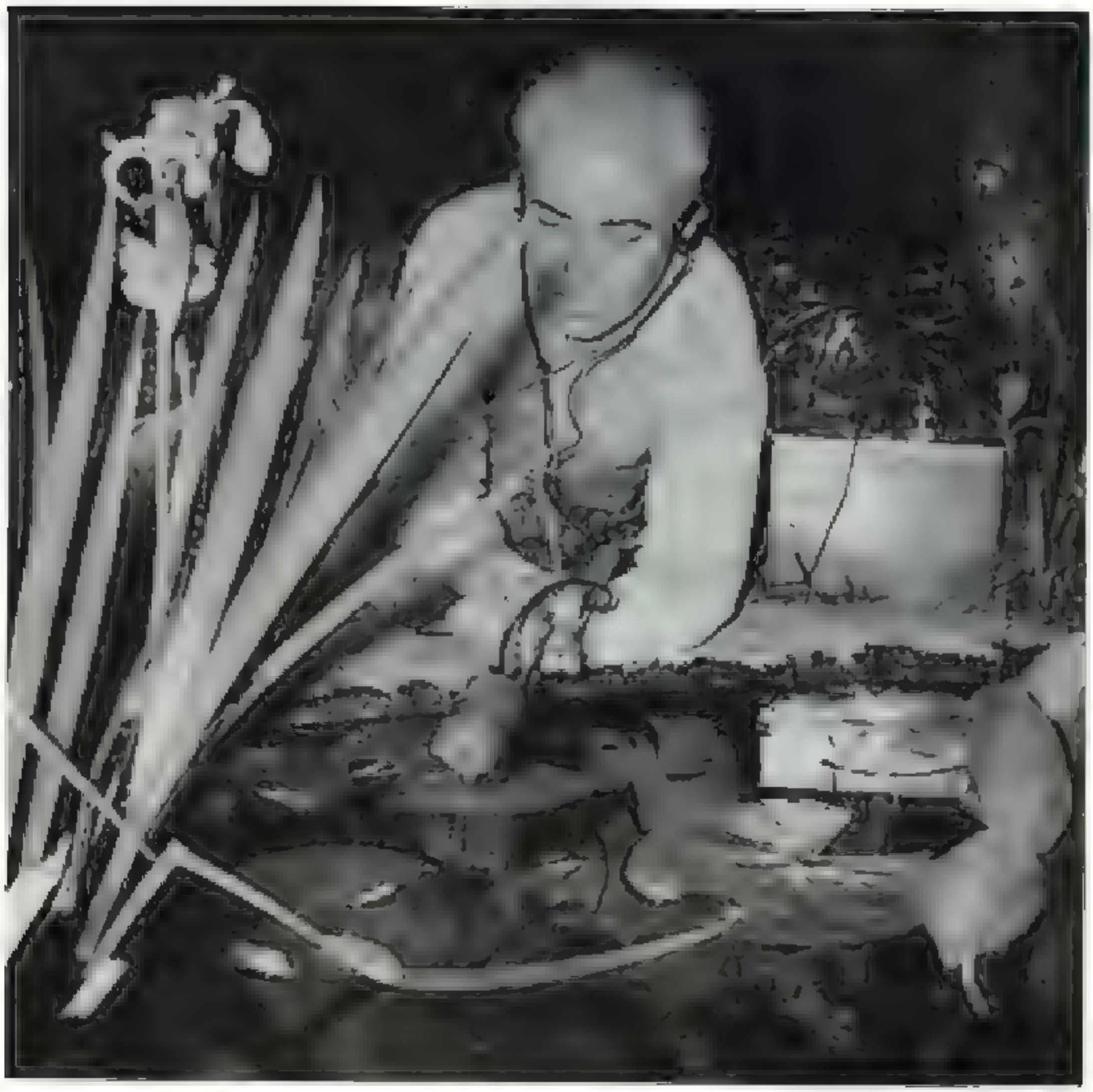
A similar chorus of the bird-voiced tree frog (*Hyla avivoca*, page 518) may start off like a distant pileated woodpecker; but as other individuals join in, the sound travels through the southern forest in great waves, ebbing and flowing and confusing the listener as to its identity and whereabouts.

Such a chorus we recorded on Indian Island, Georgia, without seeing the musicians or knowing where they were hiding.

Many tree frogs have special places where they spend the day, though they may travel

"Move Over, Fellows!" High-speed Photography Catches a Meadow Frog in Midair

[illegible]



A Barking Frog Adds His Volume to Cornell University's "Library of Natural Sounds"

With microphone and pre-amplifier [illegible]

[illegible] as [illegible]

Prof. C. J. Goin of the University of Florida, a leading herpetologist, showed me [illegible] tree frogs on the [illegible] side of [illegible] and in the gallery (page 512). Evidently he had been operating [illegible] there for more than [illegible] night.

Oak Toad Marked Like Tapestry

Common toads that are about the garden path in the evening [illegible] would [illegible] a stone that [illegible] them as a home during the day.

One of the strangest calls of the whole [illegible] oak toad, *Bufo quercicus*, a common resident of the Southern States as far north as North Carolina. It is less than an inch long, and during the day might be mistaken for a young common toad or hoptoad, *Bufo terrestris americanus*, except for the [illegible] markings on its back that give the effect of tapestry [illegible].

Our [illegible] it was [illegible] for we could hear only [illegible] a flock of baby chicks calling out in the [illegible] night, when they should have been safely under their mother's wings. [illegible] down the [illegible] we came

Spread-leg Hopper Sticks in a Mexican Tree Frog's Claw

[illegible]

upon one of the [illegible] shallow puddle in the [illegible] woods [illegible] Little's enormous sausagelike vocal sac protruding from his throat to far above his head.

The chicklike peeping call was so out of proportion to the size of the music box and so different from other amphibian sounds that at first we thought something must have punctured the little creature's sounding board. Dozens of others, however, sang exactly the same way.

While we were recording this oak toad, there were several other species singing near by, and we rejoiced to have a quiet spot where few cars passed. But we had scarcely [illegible] on another species before a long line of cars went by, because [illegible] dull glow down the back road. Soon the jukebox was going, and we realized we [illegible] selected the [illegible] roadhouse for our evening's work.

On our way north from this Georgia expedition, we stopped one night near Fineburst, North Carolina, when we heard a curious nasal [illegible] from a wooded hillside. [illegible] we discovered a [illegible] pond at the edge of the woods where there were [illegible] or ten bright green tree frogs giving voice to the chorus we had heard from the road.

Occasionally a [illegible] would answer his call to the ensemble—a great improvement, [illegible] be [illegible] that so often [illegible] otherwise attractive recordings. I thought we were recording the green tree frog (page 518), although there was a certain doubt [illegible] to the measure that seemed [illegible].

In the beam of the flashlight I did not notice the Lesueur's frog below the [illegible] the side of the frog. Not until three days later, when showing the specimen to a frog loving friend, was our attention called to the stripe, and we realized that we had recorded the much rarer Anderson's tree frog (*Hyla andersonii*), the very one we had [illegible] at the time [illegible] carried out to the New Jersey pine barrens hoping to find.

The Anderson is found from New Jersey to North Carolina. Associated with it is another amphibian, the carpenter frog [illegible] (page [illegible]). [illegible] similar places [illegible] carpenter frog [illegible] in [illegible] [illegible] Anderson's tree frog [illegible]

giving the strange appearance of a frog with water wings.

A still more human touch rewarded us in New Jersey when we recorded the pickerel frog (*Rana palustris*, page 522). This species is not unusual in appearance, but when it calls it reverberates like that sleeping neighbor in a Pullman.

Toads Exude a Milky Poison

We might just as well have recorded this frog's snores at home or in any cool pond east of the Rocky Mountains. It resembles a small brown meadow frog, but it is yellow under the legs. Its skin secretes a substance that is poisonous to other frogs, so that they cannot be kept together in close confinement.

Toads also, when annoyed, exude a milky substance from the glandular swellings on their skins. Dogs and other enemies usually leave them alone, although snakes are not so particular. These truly beneficial little animals are supposed to produce warts on the fingers of children who handle them. How this tale originated no one seems to know. One should be careful, however, not to rub one's eyes after handling toads, for even a trace of the secretion will cause eyes to smart.

By the end of the summer we had recorded satisfactorily the calls of 20 of the frogs, toads, and tree frogs of eastern United States, and felt ready to publish an album of records devoted entirely to the tailless amphibia as a companion volume to that of the American bird songs.

We had been so intent on making sure of our identifications that we had captured the actual frog whose voice we had recorded, and this had precluded taking action photographs of them singing. The photographic record, therefore, had to wait for another spring.

Years ago it had been my privilege to assist Dr. and Mrs. Albert Hazen Wright in flashlighting these interesting creatures for some of the illustrations in their *Handbook of Frogs and Toads of the United States and Canada*, a third and greatly enlarged edition of which has recently come out. That was in the days of flash powder and slow black-and-white film.

Now, with flash bulbs and color film, the results are more satisfying, although the procedure is much the same. One locates his quarry as we did for the recording.

Most species are not very timid when singing, and if one works rapidly he may be able to get focused and flash the bulb while the air sac is still inflated. More often, however, one focuses on the deflated frog or toad and then waits in the dark for him to call again before firing the bulb.

It is a help to have an associate to hold the light on the frog while focusing. Sometimes the frog jumps forward when he calls, just enough to be out of focus on the processed film. Or perhaps his air sac may be so large as to extend out of the plane of focus, though the frog himself be perfectly sharp.

Perhaps, too, the creature will refuse to sing as long as the camera is pointed at him. This happens often on moonlight nights, when the frog can perhaps see the camera and mistake it for a night heron.

Stalking the Bullfrog

The bullfrog (*Rana catesbeiana*) is probably the best known of all the tailless amphibians, both for its sonorous voice and for the epicurean delicacy of its hind legs (page 521); yet it gave me more trouble than any of the others. Time and again I tried to stalk one—in Florida, Georgia, North Carolina, New Jersey, and in New York; but every one was so timid that it would not permit approach.

Finally, in a beaver pond near Ithaca, New York, we discovered that with a canoe we could get within photographic range (five feet) of the thundering amphibian.

These particular bullfrogs were calling from the open water of the beaver pond, where beds of water plants came nearly to the surface. Their large eyes glowed in the beam of the daklight, so that they were easy to find.

When only their heads protruded, they showed green with yellow throats, and their bodies were very dark. This indicated that they were not ready to sing, for the preamble to song is to inflate the body, which causes it to float on the surface. It then changes from nearly black to a dull, putty color.

If alarmed when floating, this frog gives a sudden synchronous grunt and jump, which automatically deflates it so that the jump ends in a dive resembling like the old swimming hole "belly flop."

These exasperating performers sang so infrequently, however, that it was impossible to hold the canoe and tripod in exactly the same place for one to five minutes between calls.

Finally we found a fairly friendly frog in about two feet of water, where I could sit in the canoe while my wife and son, Glen, held it steady. Then, without disturbing the crooner, I could set the tripod in the water where the distance from the lens to the subject would not change even if the canoe drifted.

The principal difficulty with this setup was that the camera was so close to the water that there was not sufficient angle to show off the vocal sacs to advantage.

The eyes of frogs protrude like the head-

lights of a car, but when touched they immediately retracted. I wondered if this protective measure might be of use to them when diving, but they traveled so fast that my eye could not discern what happened.

Therefore, with the aid of several Cornell [illegible] I [illegible] a series of photographs of frogs jumping, using the speed flash at 1/5000 of a second.*

We had difficulty getting the frogs to jump in the plane of focus, but eventually secured a few satisfactory snaps of the ordinary garden variety of jump, where the eyes are kept open and the arms and legs left extended in normal pose. We also snapped the high dive, in which the frog closes his eyelids, shuts his nostrils, folds his arms back against his body in a very streamlined manner, and hits the water with his nose (page 510).

Sometimes a frog attempted to jump so high that he lost his momentum before completing the jump. Then, instead of landing front feet first or all four feet together, the hind legs dropped, and during the fraction of a second when the flash made the picture he appeared to be dancing on his hind toes.

There are some 2,000 species of tailless amphibians in the world, belonging to 14 families. The largest number of species occur in the New World Tropics, but eight families and 99 species and subspecies have been described from the United States and Canada.†

The three familiar groups in the United States and Canada are the frogs, the toads, and the tree frogs or tree toads, as some of them are called. There are a number of structural differences separating these three families, but, in general, frogs have smooth, moist skins and toads dry, warty skins.

Tree Frogs Equipped with Suction Pads

Tree frogs resemble the frogs in their moist skins, but they have suction pads on their fingers and toes, which enable them to cling to vertical surfaces. Indeed, the southern green tree frog is known to jump from near-by vegetation onto lighted windowpanes for insects attracted there by the light (page 518).

Most of these amphibians are more active at night than during the day, though during the height of the breeding season many species call irregularly all day. Indeed, peepers (*Hyla crucifer*), cricket frogs (*Acris gryllus*), and swamp crickets (*Pseudacris nigrita*) when undisturbed sing nearly as continuously by day as by night. They are much less timid and much more easily observed, however, with a flashlight at night.

North American frogs and toads vary in size from the female bullfrogs, whose bodies may be 10 inches long and may weigh 3½ pounds, to the pygmy swamp cricket, or little chorus frog (*Pseudacris ocularis*), the males of which are the smallest vertebrate animals in North America, scarcely one-half inch long even when grown (page 521).

Most of these little creatures are insectivorous, but bullfrogs have been known to catch birds, to eat other frogs, and even to swallow snakes and alligators longer than themselves.

In most species the females are larger than the males, owing perhaps to the large number of eggs they carry. They are not equipped with the vocal sacs of the males and are usually silent. Some, like the common toads, have a limited variety of chirping notes apparently to help in sex recognition.

Many male tailless amphibia have secondary sexual characteristics, such as the swollen thumbs of the meadow frogs or the enlarged eardrum of the male green frog (page 520). Male bullfrogs and green frogs have yellow throats, while those of the females are white; and the vocal sacs of toads and tree toads, when not dilated, register darker areas than the corresponding parts of the females.

The vocal sacs are inflated through a narrow slit or two slits in the floor of the mouth. They serve only as sounding boards, to give resonance to the calls produced by the air driven back and forth from the lungs to the mouth past rather simple vocal cords.

If the little animal sings with its throat only partly inflated, which seldom happens, the sound produced has a different quality. When singing or croaking the frog's mouth is kept tightly closed.

Only under the stress of great fear, as when captured by a snake, is the mouth opened, and then the resulting cry is a scream different from the normal call.

People are becoming much more sound-conscious, and many of us are distressed to hear western meadowlarks singing in movies purported to have been made in New York State, or California wrens tits singing near Lake Champlain.

Perhaps someday we shall be just as particular about our night sounds. We shall not have frogs croaking with their mouths open, or western toads singing east of the Mississippi. Indeed, I visualize the time when the majority of us will drive along the road on a spring night and recognize the authors of songs that rise from roadside ponds as readily as the voices of radio crooners.

* See "New Light Dawns on Bird Photography," by [illegible], National Geographic, June, 1948.

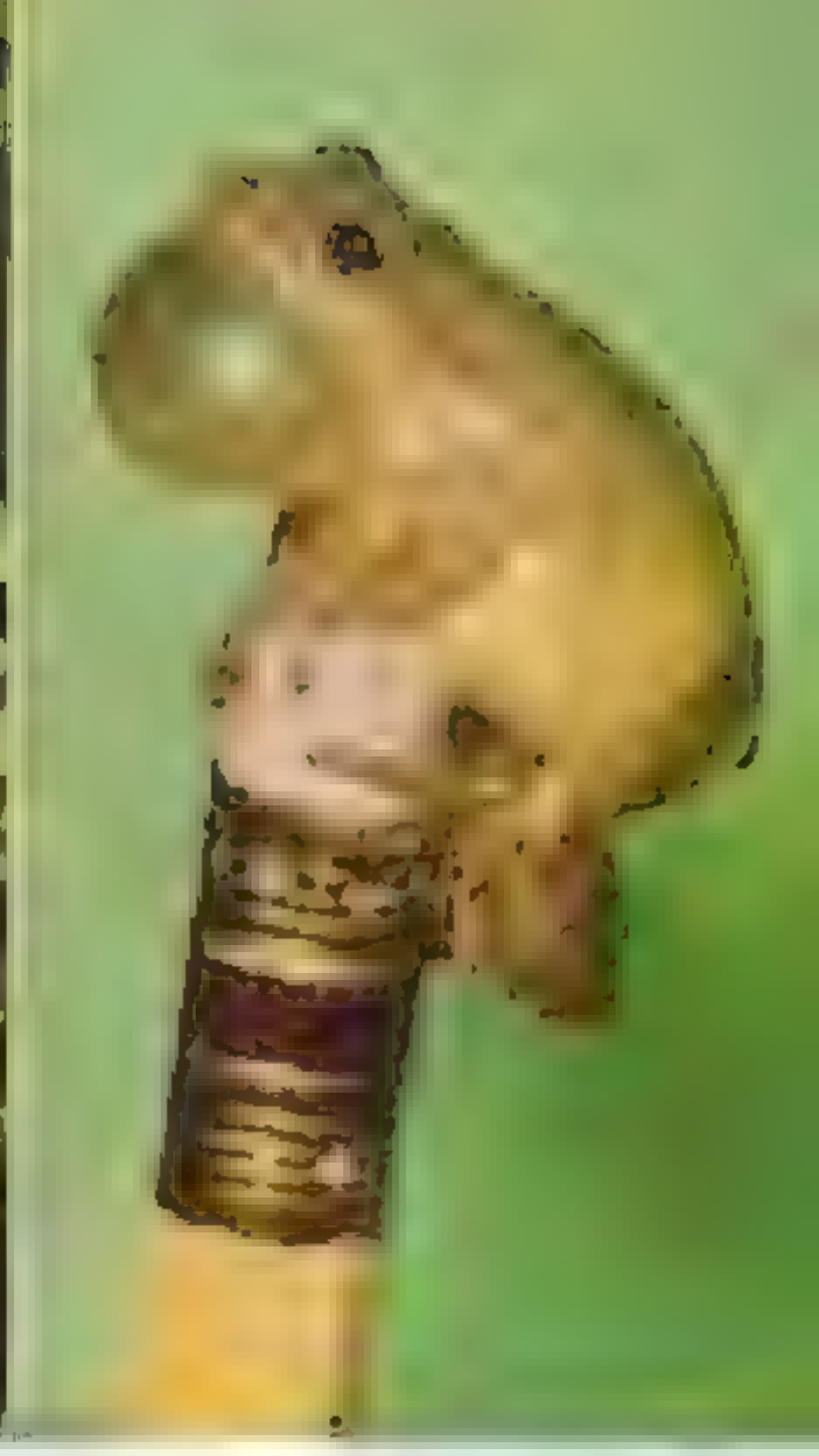
† See "Our Friend the Frog," by Doris M. Cochran, National Geographic Magazine, May, 1942.

Marcel Duchamp Pal Wessel Lend Relations His Novel Sex and Brows p Miscellaneous Blast

Toads Whistle, Like Birds, Peep Like Chicks, or Trill Softly

▲ Camouflage Protects a Singing Tree Toad; Spring Peepers Perch Unprotected on a Pencil

[illegible]



▼ The Small Southern Tree Frog Climbs and "Purrs" Like a Gray Squirrel

[illegible]

The South's Common Green Tree Frog Poses as Hunter, Photographer, and Transvestite
A Candid Shot Catches the Seldom-seen Black-eyed Tree Frog (Lower Left)

Unlike the Leopard Kardesing Tree Frog Can Change His Spots

4 A Croaking Green Frog Carries On, Uninterrupted by Photography

[illegible]

5 A Flash in the Night Catches the Female Starine Wide-eyed at an Intruder

[illegible]

* Lose Devid Before Goliath: a Pimy Swamp Cricket Frog Faces a Giant Bullfrog

* "Jug-o-Rum!" Body and Throat Inflated, a Bullfrog Twangs His Bass Fiddle

Some Aquatic Frogs Wear Gloves, Swim Suits and 'Water Wings'

Feast Day in Kapingamarangi

By W. Robert Moore

With Illustrations from Photographs by the Author

"THERE it is! There's Kapingamarangi." The youthful skipper of our small ship lowered his binoculars and [illegible] them toward me.

Through them I could distinguish only a hazy line dead ahead on the horizon. But it was our landfall, and I was seeing a hope become fact.

Months before, my interest in Kapingamarangi had been aroused when an officer at the Navy Department in Washington tripped lightly over its musical syllables. Like Kalamazoo or Kealakekua, it was a name I couldn't forget.

Later, in Guam, I learned more about Kapingamarangi from a civil administrator official in a discussion of the four [illegible] mandated islands of the Pacific, over which the United States now has control.

Uncle Sam's Remote Polynesian Wards

"Kapingamarangi, you know, is Polynesian," he explained. "The language and customs of the people there and at its nearest neighbor, Nukuoro, 200 miles to the north, differ from those in all the other island groups of our Trust Territory. The rest are Micronesian.

"Why Polynesian folk should be on these two isolated atolls, hundreds of miles away from any part of Polynesia, no one knows. But there they are" (map, page 530).

As we talked, a comely Polynesian maid smiled at me over my informant's shoulder from a framed photograph on the wall. Her home was Kapingamarangi.

In Truk I learned that an American supply ship was due to leave soon on a southern "run." It was scheduled to call at Kapingamarangi, nearly 500 miles to the southward, close to the Equator. When it sailed I was aboard.

A few days later I stood on the bridge watching the Kapingamarangi island mass grow and simplify into thick clusters of coconut palms and heavy green breadfruit trees (page 524).

The sun slipped down into the orange-stained sea ward we maneuvered through narrow Greenwich Passage and entered the lagoon. In the short tropic dusk that followed we were afforded only a brief view of the 33 islands which stud the atoll, pear-shaped and seven miles long.

Only a few yellow lights from tiny coconut-oil lamps flickered across the water from two or three islands near where we anchored in darkness. But our arrival had not gone unheeded.

Numerous outrigger canoes emerged from the blackness and swarmed about our ship. They were slender craft, with incurving gunwales and long spidery outriggers, unlike any I had seen in other Pacific islands (page 531).

"There's King David," said one of my shipmates, when a long white canoe swung into the lights of our landing ladder.

Seated amidships in the craft was a bulky figure clad in a khaki shirt and white shorts. Half a dozen bronze-backed paddlers manned the canoe.

Sitting in the boat, overflowing its gunwales, King David looked large. When he clambered aboard he looked even larger, for he is nearly six feet tall and must weigh between 250 and 300 pounds (page 532).

He beamed greetings at everyone on board, and made the rounds to shake hands. Deftly a local trader handled the language exchange, for the chief spoke only a few halting words of English.

Scores of other islanders scrambled aboard and crowded the deck space to see the ship now.

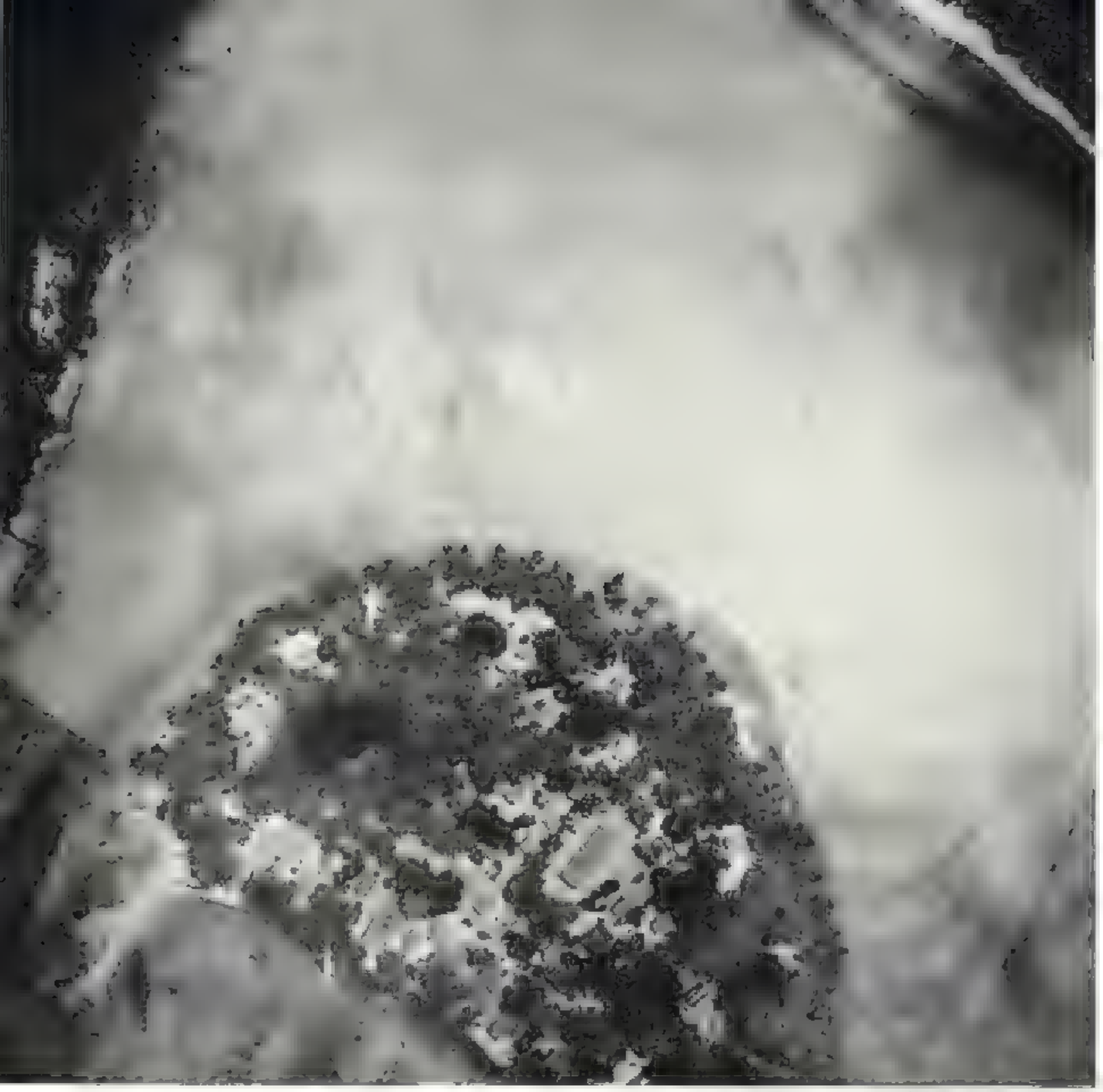
Whenever American vessels halt overnight at any of the Pacific islands, native villagers are eager to get the chance to watch the motion-picture shows.

I spent an interesting hour studying the play of expressions over their intent upturned faces as they watched Joe Palooka get enmeshed with some shysters in a real-estate and park promotion scheme.

Movies over, the people again melted into the darkness. But they had left the pleasant rumor afoot that there was to be an island wedding and feast the next day.

Natives Clustered on Three Islands

Early next morning, when I went ashore in a bobbing outrigger canoe, I found preparations for the feast already under way. Women sat in the shadows of their thatched homes and under the trees busily working at piles of coconuts, breadfruit, and *pukka*, or swamp taro (page 526). Here and there men were cutting more coconuts from the towering trees. Several canoes arrived from other islands laden with supplies (page 533).

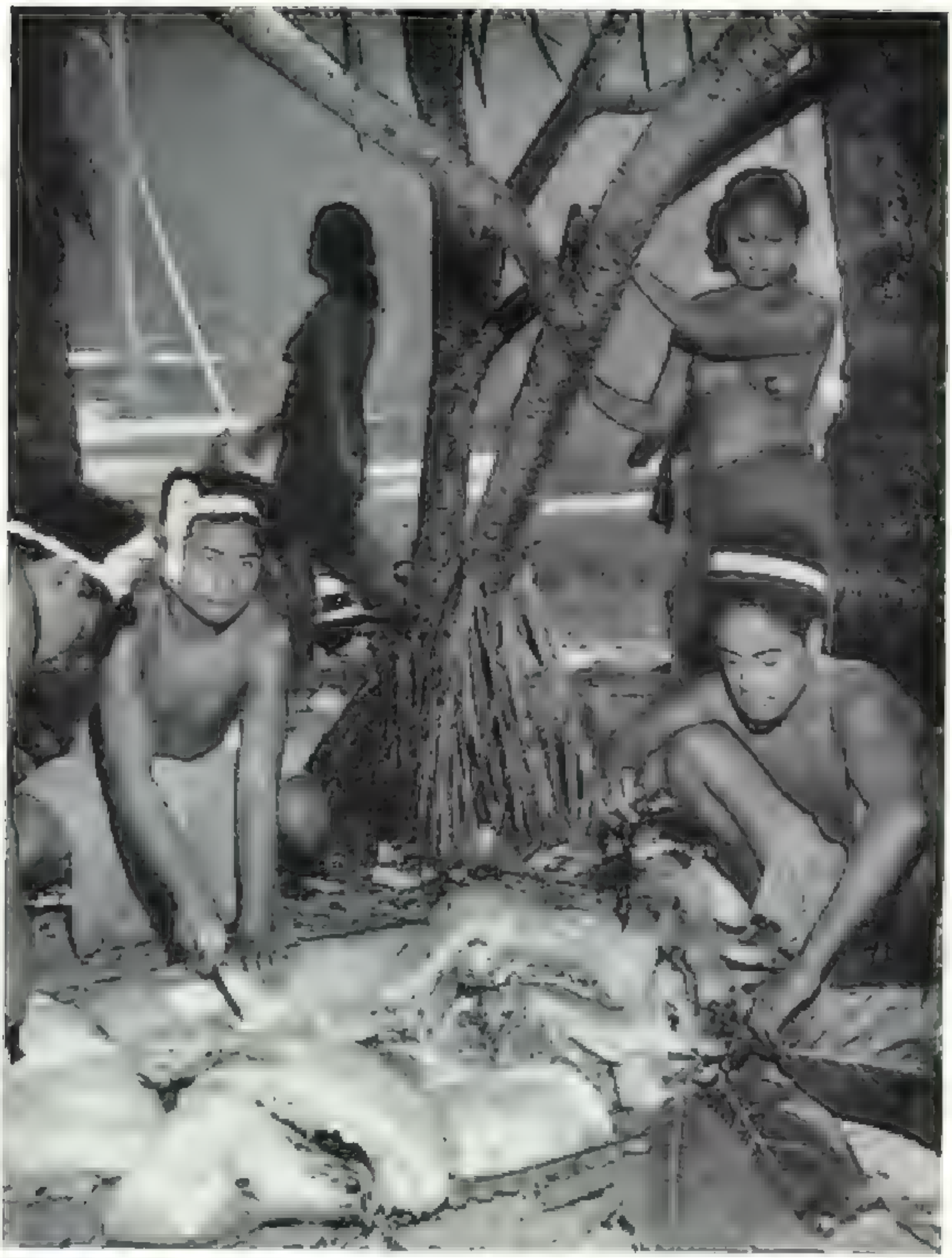


As Tightly Packed as a City Suburb Is Tiny Lubec Island

[illegible]

[illegible]

[illegible]



Pigs, Fattened for the Feast, Are Cut Up for the Island's Fireless Cooker

[illegible]

A Wide Spider's Orangeer Keeps Its Eaglike Kaneganumagi Canoe Form Unscathed

[illegible]

Soup in the Raw: Women Busily Stock Canoes for Dispatch to a Waiting Ship

[illegible]

[illegible] Throughout the morning I noticed [illegible] preparing to transport some of the soldiers' [illegible] to another [illegible]. All concerned were [illegible] with pleasure, smiling [illegible]. Visiting [illegible] I saw [illegible] [illegible] coconut [illegible].

[illegible] the south [illegible] [illegible] water for [illegible]. Others were scraping and cleaning gnemba roots.

Still other women-folk were preparing the condiment. It was a seeded variety locally called *kon*, from the fact that it had been [illegible] [illegible] to [illegible] of [illegible] the Marshalls.

[illegible] Kitchen Equipment Sample

[illegible] cream are [illegible] bit of pulp [illegible] that operation [illegible] fully in [illegible] and was ready for [illegible].

[illegible] attractively arranged. Some foods were placed

What Bread Is to the American Household, Taro Is to These Island Folk

[illegible]

in coconut shells, which serve as natural cases.

[illegible] kitchens with [illegible] mechanical [illegible] people [illegible] of the [illegible]

[illegible] coconut husks or other debris. [illegible] have been [illegible] over the fire.

When the pebbles are sufficiently heated the food is placed [illegible] and covered with leaves, [illegible]

later, the pit is opened and the food cooked [illegible] are removed still in heat sterilized wrappings and shell casseroles.

Housewives have a few implements [illegible] which to heat food [illegible] but on the most part they use only [illegible] — [illegible] would be [illegible]

[illegible] they have been [illegible] a wire and [illegible] American [illegible] that had exploded [illegible] was [illegible]

A Discarded Collapsible Navy Bucket Does Now Duty in Kapingamarangi

[illegible]

and would stand more beating when it was [illegible] shaped.

In my "kitchen hut" I found another [illegible] of preparing breadfruit. Fruits of [illegible] were placed [illegible] pebbles and [illegible]. After [illegible] their [illegible] pulp was then [illegible] with a [illegible]

[illegible] prepared that way. [illegible] breadfruit [illegible] tion. [illegible] produce [illegible]

One dish new that in [illegible] fritter cooked in [illegible]

Many times when I passed near the schoolhouse, I saw one woman patiently tending two steaming kettles. [illegible] stirring the contents and [illegible] the lines [illegible] page 533). Fragrant [illegible] Later I learned that she was making [illegible] tied to be served [illegible]

My mid-morning two pigs tethered to the [illegible] had been led to [illegible] their last [illegible] in outer kettles.

[illegible] arrived from

Drawing by F. Fearnley

Pear-shaped Kapingamarangi Lies 75 Miles North of the Equator, 200 Miles from Its Nearest Neighbor

Formerly one of the island groups controlled by Japanese mandate, the atoll now is part of the United States Trust Territory of the Pacific. Local Polynesian names for the 34 islands dotting the reef replace those used on Japanese maps. The new spellings are furnished by the Bernice P. Bishop Museum, Honolulu, whose staff recently spent months studying the culture of these people and those of Nukuoro to the north. Small craft can enter the lagoon through Greenwich Passage, but skippers must watch for dangerous coral heads.

other islands in the atoll with still more food. Women and girls jugged basket after basket to the thatched-roof schoolhouse which was to serve as the feast pavilion.

"Dress for Dinner" in Mother Hubbards

When the people were busy at their many duties, they dressed in everyday attire. Most of the women wore simple lava-lavas, or skirt-like loincloths; the men were clad in either lava-lavas or trousers.

When they had finished their tasks they clustered about the shallow wells or went to the lagoon to bathe.

Soon they began appearing in their Sunday best, which for many women meant Mother Hubbards or voluminous long dresses. The men donned shirts with their trousers, and a goodly number even [illegible] pockets and coats.

An hour before sunset everyone had gathered for the wedding (page 537). Not until I saw the wedding party assemble did I learn that it was to be a double wedding. The young folk were from four of the most honored families on the island.

Bridegroom Samuel I knew. In Truk he had studied first aid and enough simple medicine to take charge of the island dispensary.* That morning he had been clad only in a pair of navy trousers while he was assisting the pharmacist mate from our ship.

Now he appeared self-consciously in a black coat several sizes too small, gray navy trousers, a white shirt and necktie, and a pair of GI combat shoes. The other groom, wore a black suit.

The brides were attired in bulky ankle-length gowns, one white, the other gray green, on which were clusters of colored ribbons. Several bright ribbons decorated their hair.

When the grooms stood uneasily in front of the school pavilion, with the other islanders sitting on the ground round about, King David came forward and delivered a brief talk (page 532). The minister spoke a few words and a blessing.

* See "Pacific Wards of Uncle Sam," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, July, 1945.

Outrigger Canoes Surround Kamehameha's Ship Bringing Women and U. S. Ship Cecile

[illegible]

Dressed in Sunday Best, Two Island Couples Are Wed

[illegible]

Kapitanmarang Nedizses Were All Day Long to Prepare Hundreds of Dishes for the Wedding Feast

Bridegroom Spurned Entertains Villagers Following His Wedding

[illegible]

Village Youngsters Sit on Mats to Watch the Ceremony

[illegible]

Dr. Peter Buck, Director of the Bishop Museum in Honolulu, who with three anthropologist companions had been studying Kapingamarangi customs for three months, was asked to add a few remarks.

To be married here, the couple need only announce their intentions to the chief. Customarily, they live with the man's parents for a while, then go to the bride's home. Later they are free to establish their own home.

Ceremony over, the islanders queued up to congratulate the newlyweds. Some shook their hands; others rubbed noses in true Polynesian fashion; a few women shed tears.

Wedding Feast Followed by Music

Then came the feast. As honored guests, Dr. Buck and his companions and some of us from the ship sat with the bridal party and relatives at tables under the thatch roof. We ate from plates secured from the Japanese. The rest of the villagers sitting outside ate directly from the leaf-wrapped packages.

I relished every dish and ate until I was thoroughly satisfied. With a few such feasts my girth would rival that of King David, particularly as the foods are mostly starches.

After the feast was finished, I heard the strumming of a guitar near by. I found Samuel sitting in the midst of an admiring group of young folk, plucking tunes on an instrument he had brought from Truk (page 534). He already had shed his formal garb of the wedding, as had many others.

The tropic night settled abruptly over the island. As the Bishop Museum men had a small electric generator and members of the ship's crew had brought the motion-picture projector ashore to treat the islanders to a movie.

For two hours an enthusiastic audience cheered, clapped hands, laughed, and gazed with eager interest as Pluto the Pup and Donald Duck romped across the screen. The Brooklyn Dodgers played baseball, swimmers exhibited funny dives, and Hollywood stars sang.

A film showing the canyons and skyscrapers of New York brought gasps from these folk who had seen nothing larger than thatched canoe sheds and tall tufted palms.

Next day was Sunday. When I came ashore, there was none of the bustle I had seen the day before. King David and most of his people are Christian and believe that no work should be done on Sunday.

Part of the cooking on the previous day had been for the whole week end. The men had halted their work on copra, boatbuilding and sundry tasks. My picture-taking wasn't considered work, so I did not incur disfavor.

Bell announced midmorning church service. As the churchgoers began trooping to the large thatched church, they formed a striking assemblage, dressed in their best as they had been the night before. Many women and young girls arrived, however, with their dresses still folded over their arms. At the doorway they would pause, slip their "new look" gowns over their lava-lavas, then go in.

Upon leaving, many women carefully removed their formal garb. Youngsters pulled off their finery and fled.

The island has been Christian only since 1922. Prior to that, it had its traditional priests and a temple.

I talked with gray-whiskered Henry, an elderly native minister from Nakoro, who told me he had fostered the island's change.

"When I came here in 1922," he reminisced, "the temple stood where the church is now. The people had all kinds of taboos.

"That island over there," he said, pointing to adjacent gemoce Taringa, "was all taboo; no one dared stay there overnight.

"I told them I would go there and live, to prove their beliefs wrong. I planted coconuts there and made paths. Now look at it! Nothing happened to me and they believed me.

"Afterward we took the temple to the beach and burned it, and built our church."

Only remnant of the past is a big coral slab which stands upright behind the church. It serves as a monument to Ciumatua, supposed discoverer and first chief of the atoll.

When I first came ashore, my attention was centered mainly on the work of the women preparing the feast.

The Men Work, Too!

But the Kapingamarangi men also were busy. They climbed the coconut trees, slaughtered the pigs, and supplied fish and other provender.

Still other men were preparing copra for export (page 527), building canoes, thatching houses, and erecting a new dispensary.

Many tasks are community enterprises. Secondary chiefs who serve under King David decide, for example, when a house needs thatching.

Each village householder is then called upon to furnish a specified number of bundles of thatch. When these arrive, the men fall to and within an hour or so the roofing job is completed.

At the time of my visit a number of men were building a larger dispensary. Oddly enough, the whole roof assembly was almost completed and set in an open space near the beach. Walls still were nonexistent.

Deft Fingers Turn Strands of Pandanus Fiber into Belts and Bags for Trade

Patterns [illegible]

[illegible] corner posts and a studding would be [illegible] was to stand; then the roof would be carried [illegible]

The sound [illegible] well [illegible] boulder [illegible] of [illegible] [illegible] There are [illegible] of [illegible] [illegible] But as with [illegible] [illegible] the [illegible] ing of a dugout is a joint [illegible]

Building Canoes of Breadfruit Wood

When [illegible] built [illegible] is placed in charge [illegible] other [illegible] though [illegible]

From the [illegible] the [illegible] the hewing and gouging of the hull and fitting [illegible]

Most [illegible] follow [illegible] from Nu [illegible] the [illegible] [illegible]

The [illegible] part of [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Ali Kapinsamorangi Attends the Wedding and Sincerely Wants to Congratulate the Bride

[illegible]

This craft unmistakably reflects its Polynesian [illegible] of Kapingamarangi. Both are unlike any other boat types found in Micronesia.

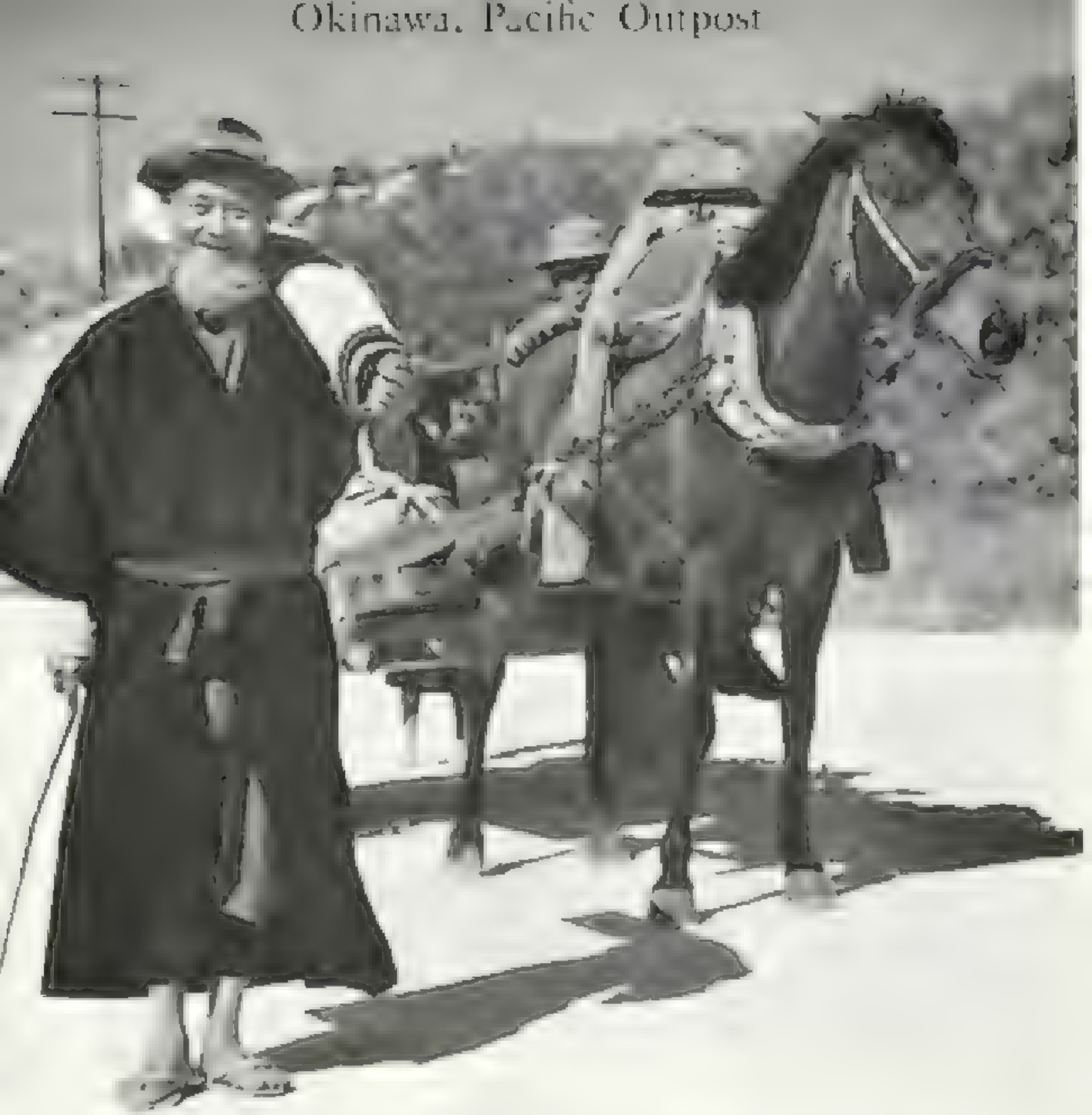
Some of these dugouts are paddling canoes; others are [illegible] with [illegible] outrigger [illegible]

[illegible] which [illegible] was catch flying fish outside the lagoon at night. With each crew member bearing a flaming torch, the boat [illegible] the inky waters and deftly [illegible] the brides-eat fish lured by the light. Catching flying fish is more of a sport than a [illegible] garnering [illegible]

On the afternoon [illegible] as if all the canoes [illegible] to race [illegible] from the number of [illegible] Lee & Kung Dance [illegible] white cates [illegible]

[illegible]

[illegible]



Lounging His Arm on a New Rifle over His Shoulder, This Smiling Okinawan Symbolizes the New Hope That Has Come to the "Doorstep to Japan"

• Okinawa's Explosives Put To Crushing Troubles on Warm Rocks

• With Family Aboard, a Boatbuilder Plans His Craft Seaward for the Launching

On Ie Shima, West of Okinawa, American Beloved War Correspondent Ernie Pyle Was Killed by a Machine Gun

[illegible]

Sham, Old Royal Capital Reveals Over Thousands of Bodies and Skulls Related Destruction

[illegible]

P-80 Jets Pass Over New Peace Star Over Black with Screaming *Kamikazes*

[illegible]

Link's Crew Poles Out Into Sheltered Cove; Once Past the Reef Sea Breezes Will Ballooning Her Sails

Chief of Staff J. Lawton Collins Addresses the Army on Okinawa. Above, Back of a P-51's Guns Glisses Observers' Eyes. Below

Even to Obama Comes the Selfeserve Podcast

[illegible]

"When the Light Comes On, You Know It's Lit"

[illegible]

Around Naha's Deepwater Harbor, Jeeps, Trucks, and Bulldozers Are Jammed, Awaiting Shipment to Salvage Depots

Industrious Okinawans Build a New Life on the Ruins of the Old

When Typhoons Rip Okinawa, Tornado Winds Snap Telephone Poles, Crush Quonsets Like Matchboxes, Scatter Crates Across Fields

Typhoon "Gloria" Swept Away These Washrooms, So 13th Air Force Men Hang Their Clothes on a Tripod and Shower in the Great Outdoors

"Sal and's Gal"
Pupils Large and Gone
Desk to the Professor!

[illegible]

Lost Kids In World Over, Shari Scull Pry Calls for "Ebonics Gone and "Cloroboi"

Elaborate Tourist Resorts to Okinawa's Concern for the Hereafter

[illegible]

Only 11,000 Okinawans Can Read, So Circulation of *Okinawa Daily* Is Limited

[illegible]

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDING
SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON 6, D. C.

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded, [illegible] the staff of the National Geographic Society publishes this Magazine [illegible]

Articles and [illegible] The Magazine [illegible] organization to make.

In addition to the editorial and photographic service [illegible] by being [illegible] The Society has sponsored more than 100 scientific expeditions [illegible] years of field work to achieve these objectives.

[illegible] expeditions have probed back the interior [illegible] of the United States [illegible] the ruins of the [illegible] monumental buildings [illegible] Society's [illegible] Amazon [illegible] and practical [illegible] for three hundred years.

In Mexico, The Society and the Smithsonian Institution [illegible] January 19, [illegible] the oldest work [illegible] have a date. [illegible] Maya characters with a date which [illegible] It antedates by 900 years anything heretofore found in America, and reveals a great empire of early American [illegible]

In November [illegible] to the Bahama [illegible] Air Force, also [illegible] largest tool [illegible] Admiral H. [illegible] Capt. Albert W. Stevens and Lieut. Orvil A. Anderson took aloft [illegible] of extraordinary value.

The National Geographic Society [illegible] U. S. Army [illegible] in southern Brazil [illegible] eclipse of 1947. This [illegible] work [illegible] of The Society [illegible]

The Society cooperated with Dr. William Beebe in deep sea explorations off Bermuda during which a world record [illegible] feet was attained.

[illegible] granted $25,000 and an additional $75,000 was given by the [illegible] members to the [illegible] program for the purpose [illegible] National Park [illegible]

[illegible] of the [illegible] interest [illegible] and cultural centers [illegible] Mexico and Yucatan by Dr. Earl H. Morris while [illegible] Society and the Harvard Institute of Human [illegible]

[illegible] Entered at the Post Office at Washington, D. C. [illegible] special rate of postage provided [illegible] Act of October 3, 1917, [illegible] Marca [illegible]

SHOWN ABOVE [illegible]

WORLD'S FINEST, MOST MODERN AUTOMATIC DISHWASHER

...the new GENERAL ELECTRIC

WHAT OTHER DISHWASHER CAN MATCH THESE FEATURES:

- ★ Top-operating for easy "sink-level" loading!
- ★ No scraping, no soaking!
- ★ GIANT capacity—holds a WHOLE DAY'S DISHES for family of four!
- ★ Super-hot water—hotter than your hands could stand!
- ★ COMPLETELY automatic — just turn one setting for essential!
- ★ Saves time, ... saves work, ... saves money!
- ★ G-E performance engineering assures long-lasting dependability!

"Natural Heat" [illegible] DRY IN THEIR OWN HEAT!

ONLY G-E ENGINEERING COULD BRING YOU ALL THIS!

1. [illegible]
2. [illegible]
3. "NATURAL-HEAT" drying that [illegible] DISHES DRY IN THEIR OWN HEAT

LOW DOWN PAYMENT! EASY TERMS!

[illegible] Dishwashing Machines" in [illegible] General Electric Company, Appliance and [illegible] Department, Louisville 2, Ky.

Also see the new G-E Portable Dishwasher

YOU CAN PUT YOUR CONFIDENCE IN ~

GENERAL ELECTRIC

[illegible]

Service at its finest...comfort at its best...

when you go—and stop—

Canadian Pacific

See Canada's

Cruise to Alaska

You'll feel at home

Canadian Pacific

SEEING THE WORLD

Air Lines • Hotels • Steamships • Express

COLORADO

HAS A LOT OF FUN IN STORE FOR YOU THIS SUMMER...

-AND THERE'S AN EXTRA THRILL WHEN YOU GO THE WAY OF THE *Zephyrs*

Your vacation [illegible] after you've had your fill of your Burlington train!

Come to Cool Colorado this Summer!

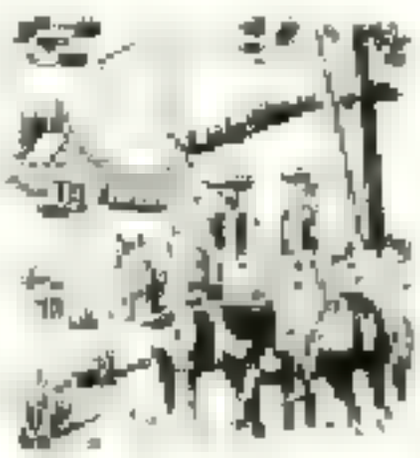
No vacationland in all the world offers you more variety—more sheer enjoyment! Mile-high Denver and its mountain parks . . . picturesque Colorado Springs and the Pikes Peak region . . . the grandeur of Rocky Mountain National Estes Park . . . the friendly Dude Ranches.

For Speed, Comfort, Pleasure . . . Go Burlington!

• On your trip to Colorado, choose one of Burlington's streamlined stainless steel trains—the famous DENVER ZEPHYR or the *Vista-Dome* CALIFORNIA ZEPHYR. Or ride the COLORADOAN. There's no extra fare on any Burlington train.

If you're considering a trip by train to Colorado, mail coupon for complete information and cost. Whether you travel independently or join an Escorted Tour, you'll enjoy every minute of your trip. Any rail or travel agent can tell you about this thrilling travel adventure.

Fish in crystal-clear [illegible] where the big [illegible]



Ride [illegible]

BURLINGTON TRAVEL BUREAU
Dept. 206, 547 W. Jackson Blvd., Chicago 6, Ill.

I am considering a vacation by train to Colorful Colorado this summer. Please send [illegible] information, including list of Dude Ranches.

Name _____

Address _____ Phone _____

City _____ Zone _____ State _____

If you are interested in other Western Vacationlands served by the Burlington Railroad, please check here:

☐ YELLOWSTONE ☐ BADLANDS ☐ DUDE RANCHES
☐ CALIFORNIA ☐ PACIFIC NORTHWEST

The Only Sterling Silver with

Third Dimension Beauty

Beauty in Front

Beauty in Profile

Beauty in Back

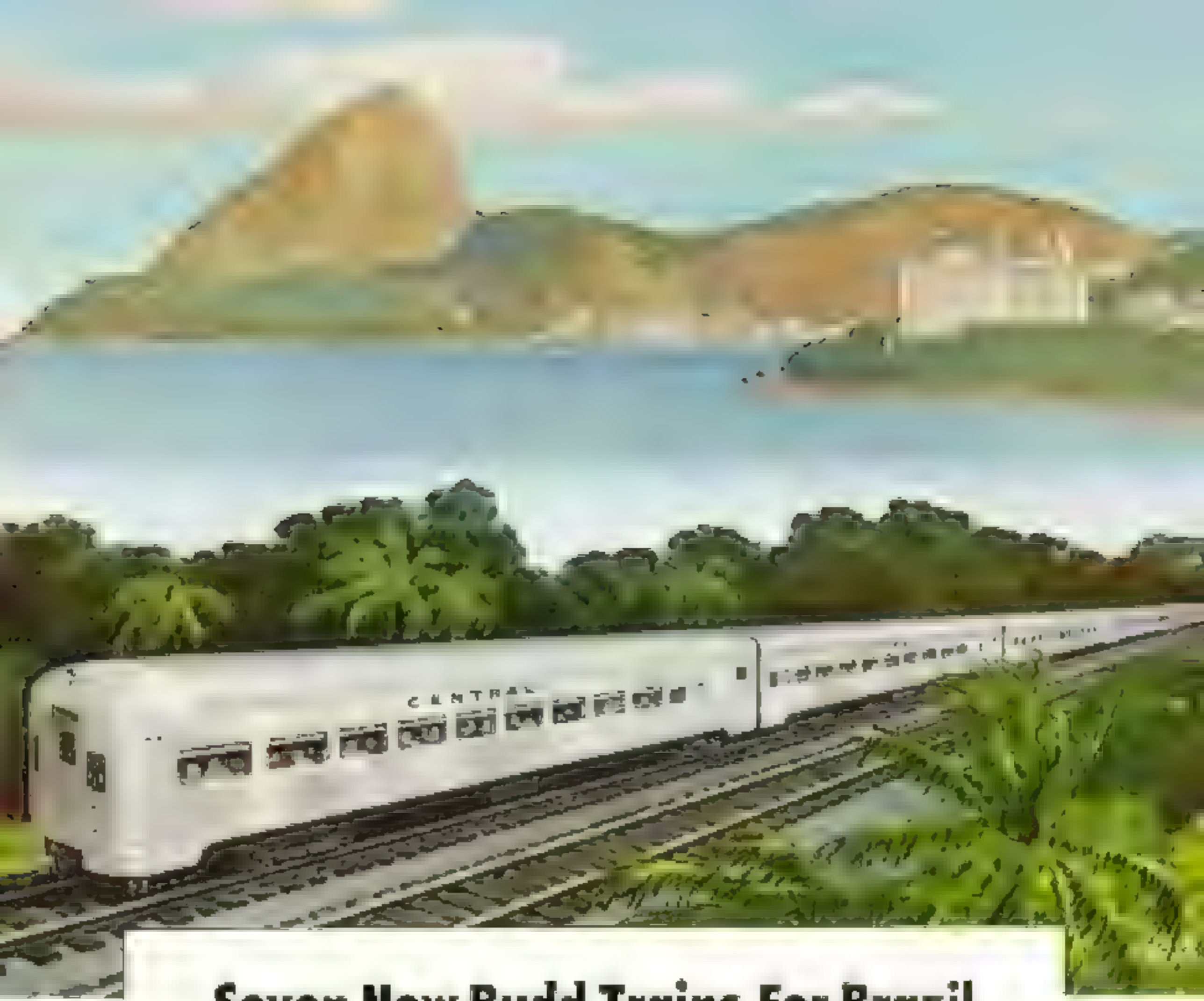
WALLACE STERLING *Silver*

It's a wonderful, wonderful feeling

[illegible]

AIR CONDITIONING **Carrier** REFRIGERATION

[illegible]



Seven New Budd Trains For Brazil

On a midsummer day last January, the S. S. Chester Sound arrived in the harbor of Rio de Janeiro with the final shipment of sixty-three all-stainless steel passenger cars built by The Budd Company, in Philadelphia, for the Central Railroad of Brazil.

These cars have been assembled into seven trains to provide the capital with daylight and overnight sleeper service to Belo Horizonte, the big center of the diamond, emerald and iron ore mines. Brazil's law is "safety first."

With the inauguration of these trains, Brazil and her railroads have gained the same kind of operating equipment . . . dining, sleeping, observation and coach cars . . . which has added such zest to travel over our own railroads since pre-war days.

It proves again that there are no geographical limitations on the desire for excellence, and that railroad managements and operating economies are improved by the power demonstration of foreign. Like every Budd-built stainless steel passenger car, these all-stainless steel Brazilian cars have been designed to withstand two hundred pounds of pressure.

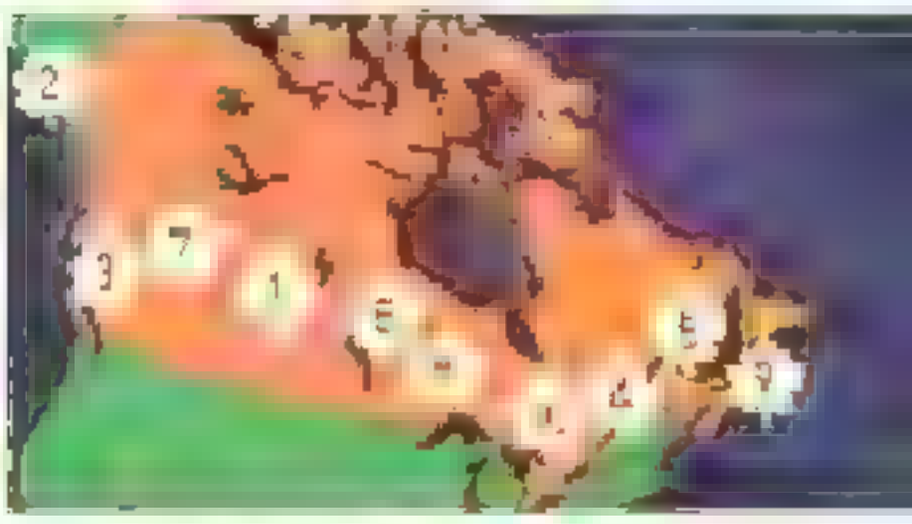
The Budd Co., Phila., Detroit

Budd

REST AND PLAY

"TAKE A TECHNICOLOR VACATION IN

CANADA'S PROVINCES BY THE SEA"



CHOOSE

1. 2.
3. 4. 5.
6. 7. 8.
9. 10.

NATIONAL

*ONE OF CANADA'S 10 TOP VACATIONS

What can you hear through an ***ear of grain*** *?*

When a scientist wants to learn what nourishment a plant is getting, they inject radioactive materials into the soil and trace their absorption with sensitive instruments. Industry and medicine also use this ingenious technique.

Until recently, scientists heard what was happening, followed the passage of atomic materials with a clicking Geiger counter. Now a more sensitive instrument —[illegible]

possible by a development of [illegible]

The heart of this counter is a new [illegible] phototube so sensitive that it [illegible] for the impact of [illegible] photons. In the scintillation counter [illegible] are converted into pulses of electrical current and amplified as much as a million times by this tube.

[illegible] 30 West [illegible] Street, New York. Adaptation to free [illegible] Corporation [illegible], Beacon City, N. Y.

The principle of RCA [illegible] tube is [illegible] RCA Image Orthicon [illegible] to give you sharp, clear television pictures in dim light.

RADIO CORPORATION of AMERICA

World Leader in Radio — First in Television

MRS. LEON MANDEL

ELLIOT LAWRENCE

DOROTHY KILGALLEN

America's "Best-Dressed" praise ELGIN styling!

"The new Elgins . . . they're beautiful, beautiful."

"So many people will go for Elgin's wonderful designs."

"Such good taste and fashion-correctness!"

"'Practical-and-smart' is my word for their styling."

Made in the U.S.A. by American Craftsmen

Extra [illegible] extra pride for everyone who wears an Elgin. These are styled by leaders — [illegible] so distinctive that they are worn and admired by America's "best-dressed" [illegible].

And the skill of [illegible] Elgin craftsmen transforms these styles. There is that extra measure of dependability [illegible] Elgin Dura-Power Mainspring. [illegible] most dependable power [illegible].

More satisfaction . . . more value for your money when you buy an Elgin! This proof is at your jeweler's, in all his Elgin [illegible].

Only an ELGIN has the Dura-Power Mainspring

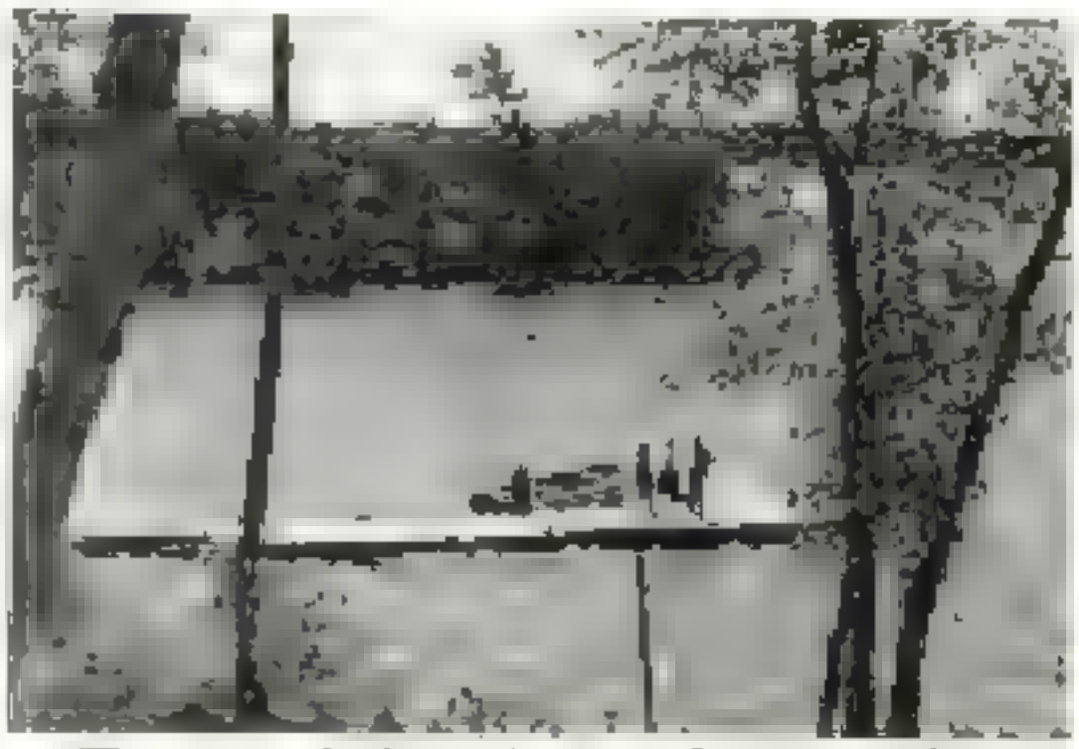
[illegible]

Loads of fun for everyone in Ontario

all year

CANADA'S VACATION PROVINCE

"You'll see the billowing beauty of Niagara, one of the world's wonders".



"The crystal air and peaceful quiet of the Northern lakes are yours for the asking".

"For fishing thrills . . . go where the fighting big ones await you—Ontario!"

". . . and for swimming or sunbathing, there's bracing water and soft sand beaches".

Come to Ontario, where customs exemptions make shopping economical, and where your American Dollar is worth $1.10

Ontario

Write Today for Free 84 Page Illustrated Booklet and Guide Map

Ever worry about how much coffee you drink?

Chances are, of coffee-loving people like most of us, you do worry occasionally about drinking too much coffee.

You worry because you know from your own experience—or perhaps those of your friends—how the caffein in coffee can make you tense and jittery—and even wakeful at night.

So it is natural—whenever you feel irritable or nervous, or if you've spent a sleepless night—that you mentally begin ticking off the number of cups of coffee you've drunk.

You wonder if you've been overstimulated lately. If you should begin to limit yourself to a certain number of cups. Or maybe cut out taking coffee altogether.

But there is a much pleasanter answer to your problem.

DRINK SANKA COFFEE

REAL COFFEE—97% CAFFEIN-FREE

It's Sanka coffee. Every time you drink Sanka, you can enjoy real coffee—good strong coffee with all the aroma, the brew, the flavor that only real coffee gives you.

And, best of all, Sanka is caffein-free. And that means worry-free!

Because 97% of the caffein has been removed, Sanka can't make you feel nervous or "put out." Can't keep you awake.

So why not start drinking Sanka coffee tomorrow. You have nothing to lose and possibly a great deal to gain.

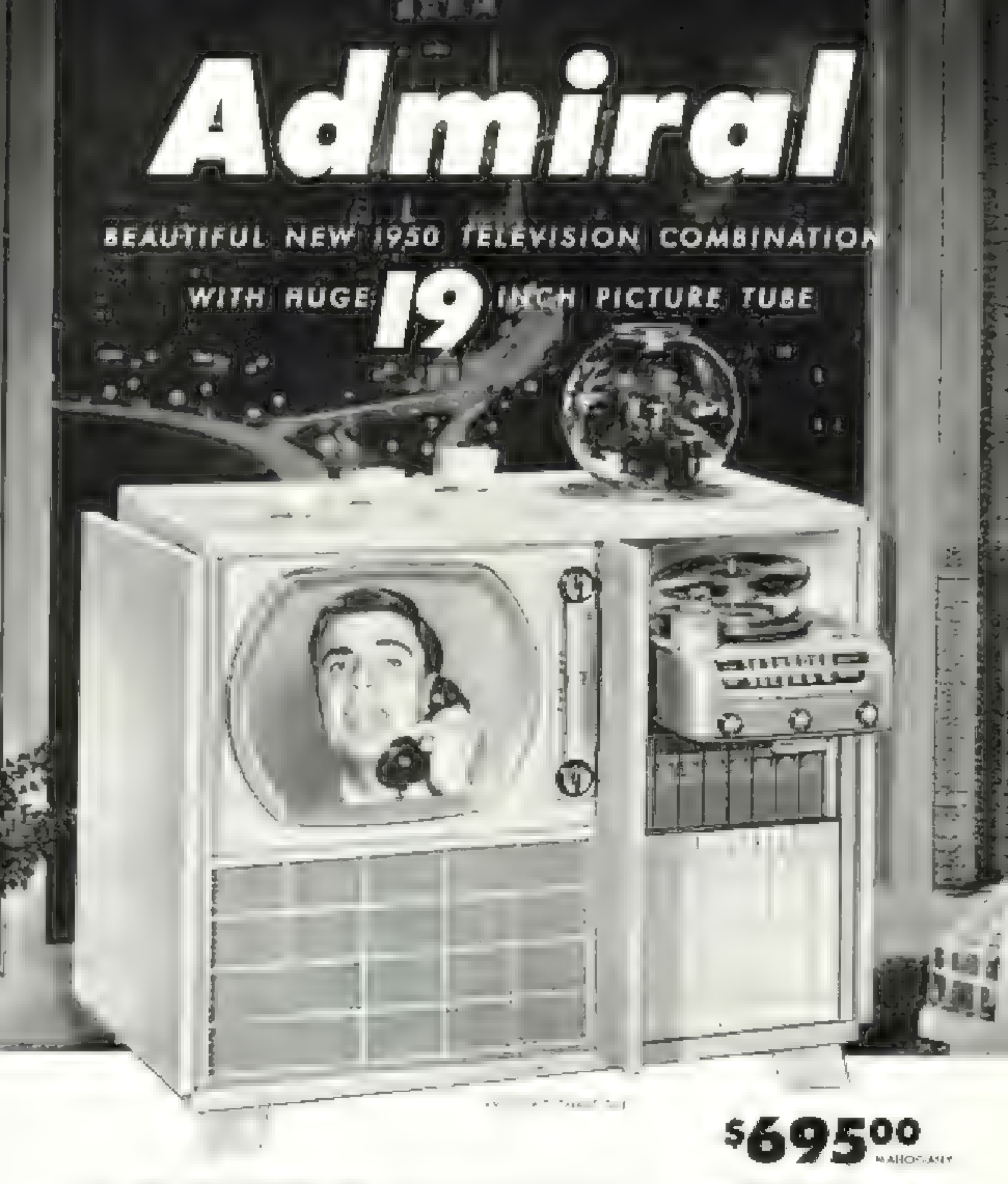
Sanka Coffee

Real coffee with the worry taken out
Drink it and sleep!

Products of General Foods

Admiral

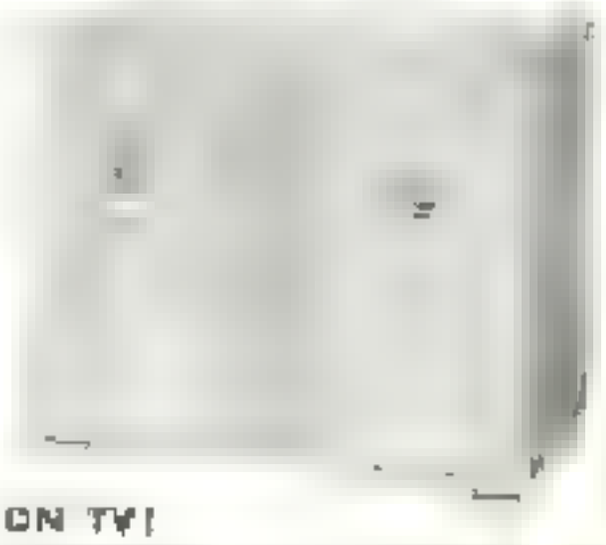
BEAUTIFUL NEW 1950 TELEVISION COMBINATION WITH HUGE 19 INCH PICTURE TUBE



$695.00 IN MAHOGANY

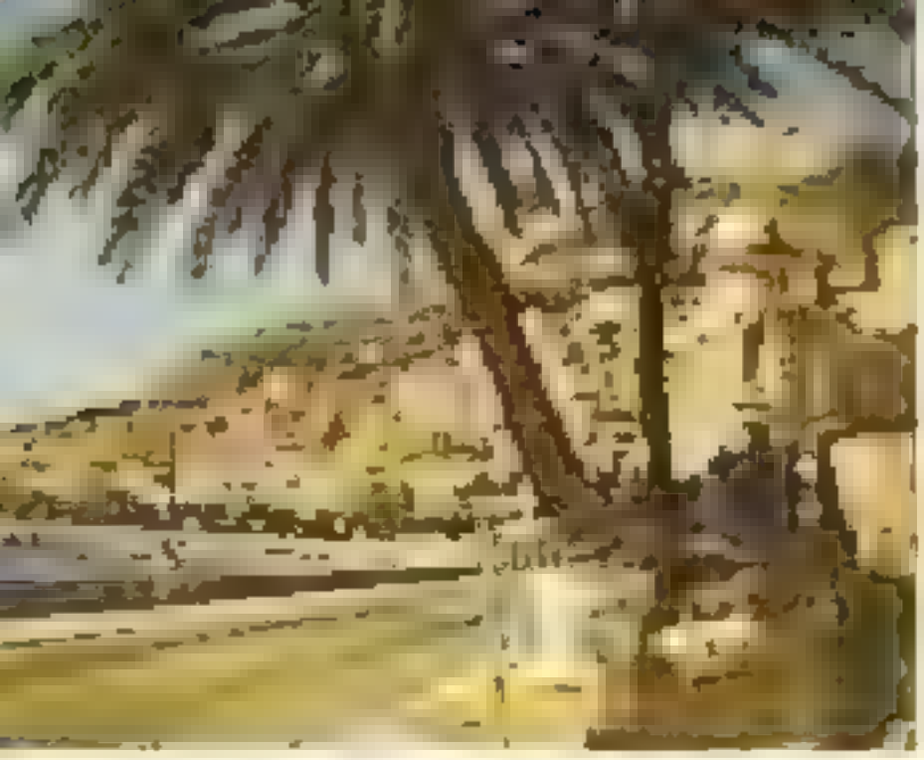
WITH TRIPLE-PLAY PHONOGRAPH! FM-AM DYNAMAGIC RADIO! SUPERPOWERED TV CHASSIS! BUILT-IN ROTO-SCOPE ANTENNA!

[illegible]



ON TV!

Stop the Music! - ABC TV Network On "Toast Of" - NBC TV Stations Nationwide

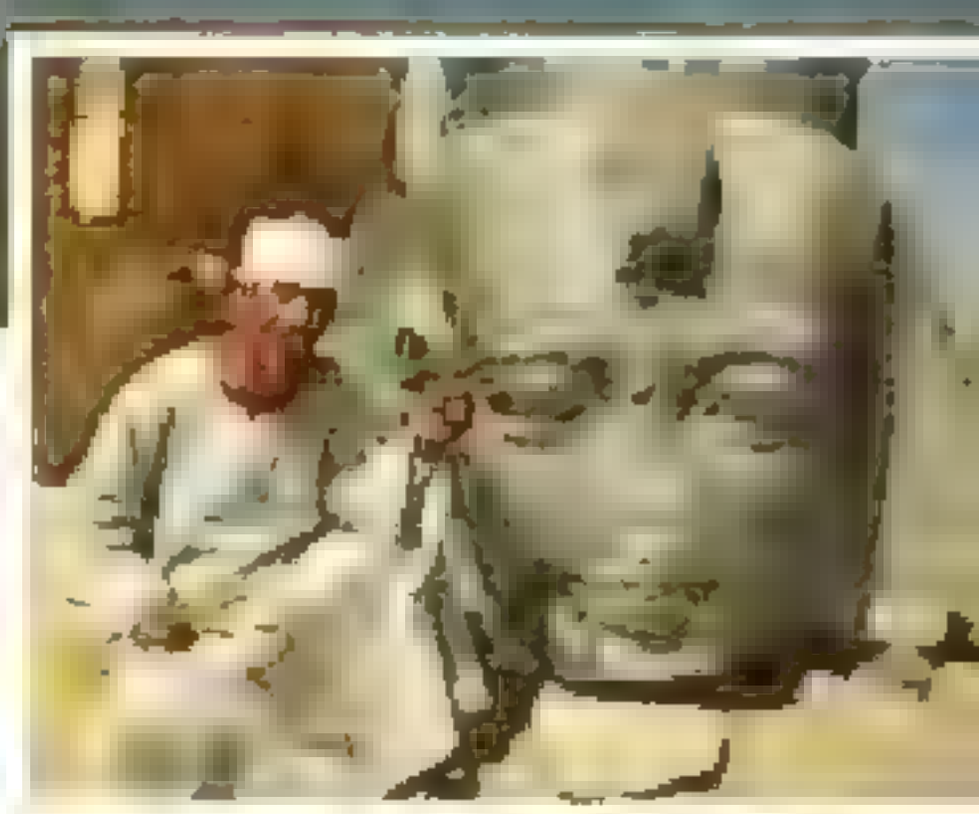


Monte Carlo, focal point of the French Riviera's Continental gayety

See all the thrilling Mediterranean

YOUR TRIP OF A LIFETIME—IN 43 DAYS!

A picturesque Egyptian felucca plies the River Nile at Cairo



Thebes in Egypt offers fascinating sites such as this hand-hewn head of Ramses II

Photographs by Ivan Smith

HERE'S one of the most fascinating, colorful and well-balanced itineraries ever offered—with 26 days in the Mediterranean.

This is the trip you'll decide upon—if you like the unusual, the rare events in travel. In any season, a trip of a lifetime!

An opportunity to see the smart Riviera . . . glorious Italy . . . Egypt's Sphinx and pyramids . . . Lebanon, scene of Biblical history . . . Greece with her awe-inspiring masterpieces and monuments.

You call at Marseilles, Naples, Alexandria, Beirut, Piraeus, Leghorn, Genoa on this matchless round-trip of the new "4 Aces". These *modern air-conditioned liners* are the result of years of American Export planning to assure your comfort, pleasure and safety afloat.

All staterooms are convertible for comfortable living, day or night—a distinctive American Export feature. Private bathrooms. Tiled swimming pools . . . sundecks . . . superb cuisine. One class only—First Class. Every other Tuesday from New York.

Also large modern American liner LAGUARDIA in monthly service direct to Italy, Greece and Israel.

Your travel agent can aid you—Consult him or

AMERICAN EXPORT LINES

39 Broadway, New York 6, N. Y.

BOSTON • PHILADELPHIA • BALTIMORE • WASHINGTON • CHICAGO
SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE • VANCOUVER

Coming—[illegible] "Independence" and "Constitution" with the new "4 Aces" forming the only transatlantic fleet of completely air-conditioned passenger vessels.

MODERN AMERICAN LIVING AT SEA

The BEST THINGS in Colorado

are free

Clean, crisp, exhilarating air; pure mountain water, relaxing, warm sunshine under china-blue skies, broad highways that lead you in a few minutes from a beautiful city, with its lawns and gardens, through quiet valleys up into pine-scented forests to the jeweled lakes and snow-kissed peaks above timberline. The rich romance of the Old West with its "Glory Hole," ghost towns, Indian ruins and famous wagon trails...all these things and many more are *free*. Yours to enjoy, among friendly people, in an unspoiled world.

Recreation

Yes, Colorado is prepared to give you the most in vacation pleasure. In this wonderland, nested among the 51 highest peaks of the nation, you'll gain new vigor and an increased interest in life. Rest, cultural, recreational and entertainment opportunities are abundant—golfing, fishing, swimming, riding, biking and sightseeing, horse and dog racing, rodeos, hockey, baseball and tennis matches, operas and concerts ...you'll find everything is here for your enjoyment.

Recreation

Peace of Mind

WRITE NOW for FREE literature to aid you in planning the most glorious vacation of your life.

DENVER CONVENTION & VISITORS BUREAU
519 17th St., Denver, Colo., Dept. 2

- ☐ Denver and its Mountain Playgrounds
- ☐ Directory of Hotels and Motels
- ☐ Colorado Scenic Highway Map
- ☐ Mountain Resorts and Dude Ranches

Name _____
Address _____
City _____ Zone _____ State _____

"YEAR ROUND VACATION CENTER"

Year in and year out you'll do well with the HARTFORD

— all forms of fire, marine and casualty insurance and fidelity and surety bonds.

See your Hartford agent or insurance broker

HARTFORD FIRE INSURANCE COMPANY

HARTFORD ACCIDENT AND INDEMNITY COMPANY

HARTFORD LIVE STOCK INSURANCE COMPANY

HARTFORD 15, CONNECTICUT

History

comes alive in

MASSACHUSETTS

IN AMERICA'S [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

WRITE TODAY

[illegible] Boston, Mass.

Please send Vacation Literature

NAME _____

ADDRESS _____

Coming cleaner

SUPER QUICK EASY CLEANING . . . practically no scrubbing . . . no fading of colors . . . no irritation for tender skins . . . [illegible] like a new and better [illegible] that's what we [illegible]

Now we can have a *modern* cleaner that removes dirt with unbelievable speed, yet is completely mild to the skin and to the sheerest fabrics. Modern cleaners carry the dirt away well [illegible] helpers [illegible]

These new cleaners are made [illegible] materials. They are [illegible] powered to work equally well in soft, hard, even salt water.

For washing [illegible] clothes, for house cleaning, for industrial [illegible] are here right now—and they are improving every day.

[illegible] are not [illegible] different chemically, and work in a different manner.

The people of Union Carbide have a hand in [illegible] of the organic chemicals that go [illegible] modern, effective cleaners. Producing [illegible] and industry [illegible]

FREE: [illegible]

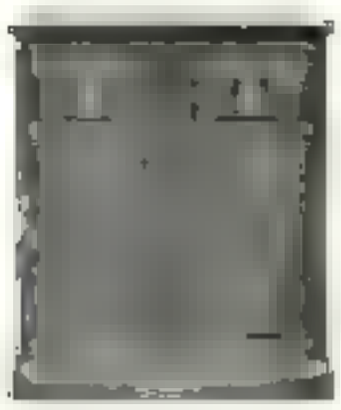
UNION CARBIDE
AND CARBON CORPORATION
[illegible] NEW YORK, N. Y.

The Du Mont Wellington. [illegible]

[illegible]

In buying a television receiver, your ultimate decision is this:

Either it is a Du Mont, or a second choice, with a lower price and a lesser reputation. If you take the time to make a point-by-point comparison, you will find this decision easy to make. In few things is the difference in quality so marked—the difference in price so small.



DUMONT *First with the finest in Television*

Allen B. Du Mont Laboratories, Inc. General Television Sales Offices and The Du Mont Television Network, 515 Madison Avenue, New York 22, N. Y. Home Offices and Plants, Passaic, N. J.

New 1950 Motorola Models

BETTER THAN EVER . . . COSTS SO LITTLE

Get the *extra* value of rich, Golden Voice tone . . . the *extra* value of big power and speed . . . the *extra* value of top quality performance. Enjoy the new 1950 model that best fits your car, your needs, and your budget! Priced from $39.95 to $79.95

MOTOROLA, INC. • 4545 AUGUSTA BOULEVARD • CHICAGO 51, ILLINOIS •

NEARBY *Nova Scotia*

CANADA'S OCEAN PLAYGROUND

For a Perfect Vacation!

IT'S SO EASY TO REACH

Overnight from Boston by Eastern Steamship Lines

MAIL THIS COUPON TODAY

MONTREAL ST. JOHN BOSTON NEW YORK

NOVA SCOTIA

NOVA SCOTIA
BUREAU OF INFORMATION
P. O. Box 135, Halifax, Nova Scotia

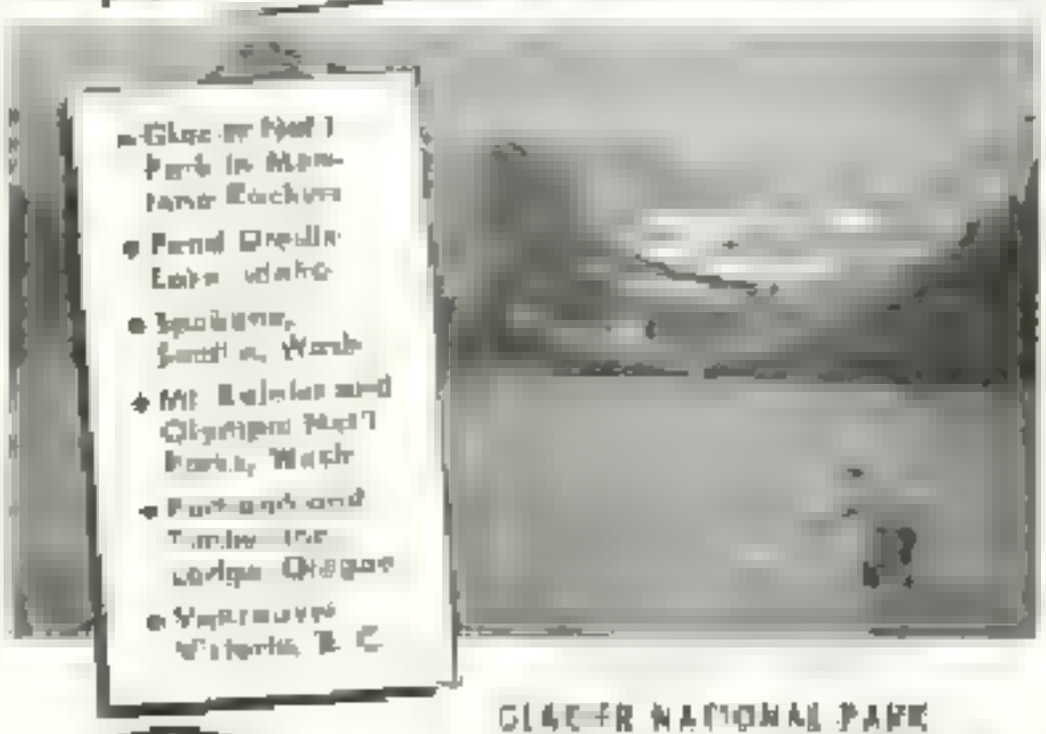
Name

Address

City

State

ONE TICKET... A THOUSAND THRILLS



GREAT NORTHERN RAILWAY

GLACIER NATIONAL PARK
PACIFIC NORTHWEST Vacationlands
ALL on GREAT NORTHERN

Name

Address

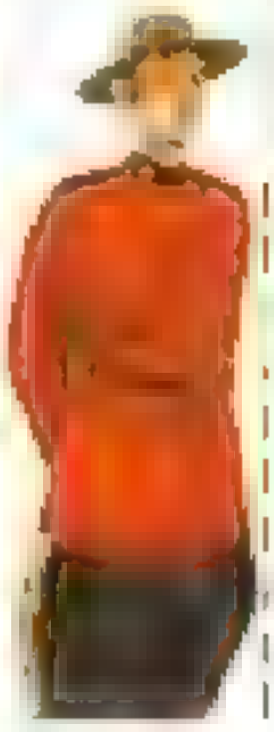
City

State

"SOME ENCHANTED MORNING" PUSH OFF INTO THE FOREST QUIET OF CANADA'S LAKE COUNTRY

Canada... for a next-to-Nature vacation

7 VACATION POINTERS — ALL POINTING TO CANADA IN 1950



MAIL TODAY

It is easier to think of being only a few hours away from Atlantic City than to think of staying away a few hours longer than you have to in this shortest of days of winter!

Atlantic City

YOU can make
SNAPSHOTS from your MOVIE FILMS
FEDERAL
ENLARGING CAMERAS
for 8mm or 16mm movie film

Model 8A for 8mm $19.95
Model 16A for 16mm

Write for literature.

FEDERAL MANUFACTURING & ENGINEERING CORP.
706 Stockton Street • Brooklyn 5, N. Y.

LAVORIS
MOUTHWASH AND GARGLE

A friendly urge...

use Lavoris because it does
a thorough job so pleasantly

DETACHES AND REMOVES GERM HARBORING FILM FROM MOUTH AND THROAT

IT TASTES GOOD — — IT'S GOOD TASTE

Bermuda
HOLIDAY...

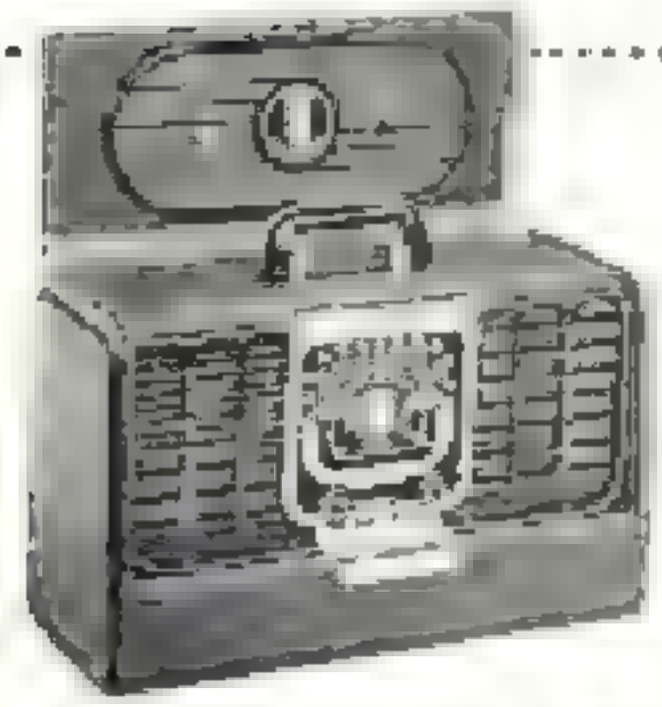
Bermuda welcomes you to a happy holiday lounging on the softest pink sand...swimming in the bluest blue water...as you enjoy to the full her [illegible] luxurious life. For all that Bermuda is and more, write for the new beautifully illustrated 16-page Bermuda booklet.

IT'S FUN to [illegible]

For a new thrill in radio— **at home or wherever you roam . . .**

New Zenith "Universal" PORTABLE RADIO

with exclusive "Tip-Top" Dial and Wavemagnet



New Zenith "TRANSOCEANIC"

ZENITH RADIO TELEVISION

For mountains, islands, sea and play
...the northwest corner of the U.S.A.

There's fun and excitement unlimited in the gay Pacific Northwest. Seattle's fascinating waterfront . . . snow-clad Mt. Rainier . . . Puget Sound ferry trips . . . the Olympic Peninsula's forests, lakes and ocean beaches . . . fine hotels and mountain chalets.

You get a lot for your vacation dollar in Montana-Washington—a varied wonderland. Frequent sailings from Seattle-Tacoma for nearby British Columbia and for Alaska.

Free Vacation Literature

For a how-to-plan and how-to-go booklet, write H. Sangerson, Passenger Traffic Manager, 630 Union Station, Chicago 6, Ill.

RIDE THE OLYMPIAN Hiawatha

This Speedliner tops off a perfect vacation. All new! Private-room sleepers with bedrooms, roomettes and Skytop Lounge; Tourlux sleepers offering berth comfort and privacy at low cost; also Luxurest coaches, dining and Tip Top Grill cars.

Enjoy air conditioned comfort on the Olympian HIAWATHA, and the best of mountain scenery without tiring drives across sun-baked plains. Cars available at your destination through the convenient Rail-Auto service.

OPENING OUR SECOND CENTURY 1950

THE MILWAUKEE ROAD

Would you believe it?

IT'S PENNSYLVANIA!

Surprised? Well, surprise is the word for Pennsylvania. In no other state is so much to do or so much that is interesting. Here, right along Pennsylvania's modern highways, you find the Mountains, Mennonites, Amish and other [illegible] to Pennsylvania's [illegible] Old-World [illegible]. Here, in great forests [illegible] you [illegible] of your life [illegible] swim, [illegible] streams, [illegible] Beaches and Islands, [illegible] Valley [illegible] — there's so much [illegible] for every moment of your vacation.

YOU'LL FIND MORE IN

Pennsylvania

JAMES H. DUFF
Governor

PENNSYLVANIA DEPARTMENT OF COMMERCE
SUITE 204 HARRISBURG PA.

I want to know more about Pennsylvania vacation [illegible]
Please send me your new illustrated [illegible]

Name _____

Address _____

City _____ State _____

20-inch cutting width $177.50
22-inch cutting width $187.50
F.o.b. Freight

[illegible]

Jacobsen MANUFACTURING COMPANY
Racine, Wisconsin

Spring's a heavenly Thing in Miami Beach

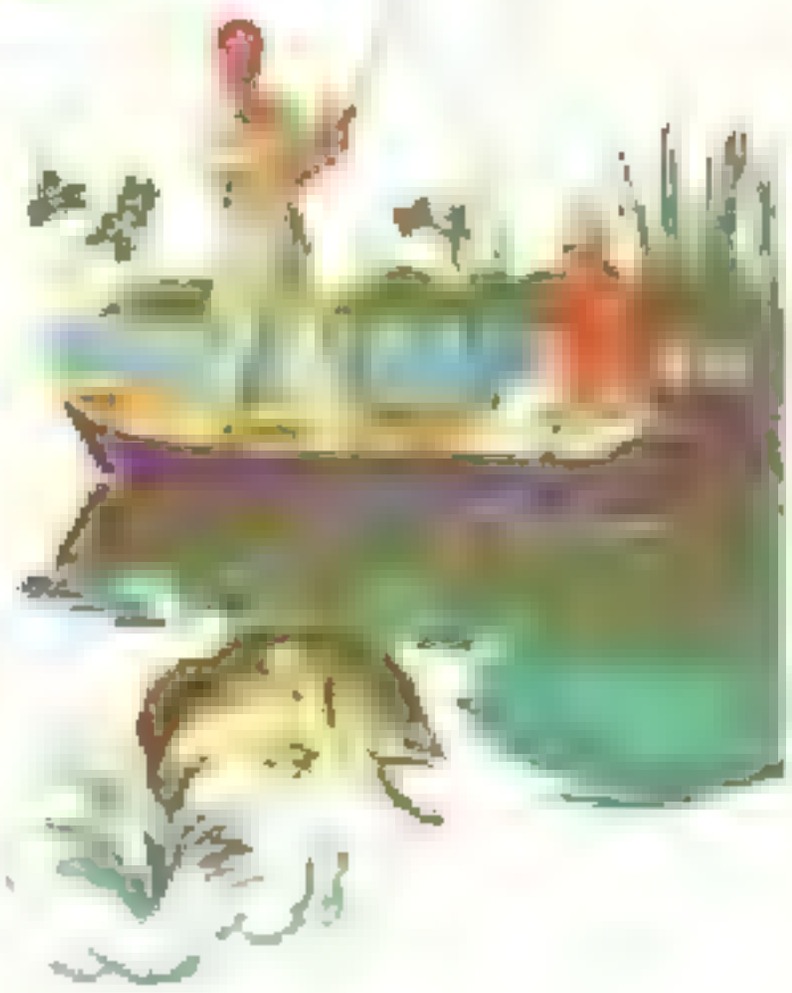
Yes, heaven yet — For no other word does justice to those sunny brilliant days of Miami Beach's days, or the starlit magic of its nights. And keep in mind — all the color, gayety, and excitement are now at their peak of season fun, while rates are pleasingly low. Another reason why now is the time to treat yourself to heavenly Spring in Miami Beach.

For FREE [illegible] and Rate Information on Hotels or Apartments address Room [illegible] City Hall, Miami Beach 39, Fla.

An Official Message from the City Government of Miami Beach

This is the Springtime

You'll remember a Lifetime



Everyone who's experienced it agrees, spring's the time to take in the whole vivid pageant of Florida's attractions — the limitless stretches of broad, sandy beaches; fairways smooth as green velvet; waters exciting ly alive with game fish; the abundance of good times Florida has to offer everyone.

And, for extra days of fun or little extra cost, make it a point to see *all* of Florida this year. Remember, reduced rates now prevail in all parts of the state — enabling you to stay longer and enjoy *more* of the many pleasures that await you this spring in Florida.

Florida

MAIL THIS COUPON TODAY

STATE OF FLORIDA
2203 COMMISSION BUILDING, TALLAHASSEE

Please send me the "Florida Information Package"

Name _____

Address _____

City _____ Zone _____ State _____

From Head Start...

to Happy Ending—

You get more vacation relaxation on NEW YORK CENTRAL

Weatherproof Start! Why let stormy skies delay your start? Leave on time, in all-weather comfort and comfort. Aboard a New York Central Deluxe...

Cool Off Right Off! In New York Central's air-conditioned weather. See the Hudson and Mohawk Valleys, the Berkshires and Great Lakes from wide picture windows.

Many Happy Returns! Why travel a way that gets you home tired and worn? For a happier return go New York Central... and get back with vacation vim and vigor!

FREE VACATION GUIDE

New York Central, Room 13348
466 Lexington Ave., New York 17, N. Y.

NEW YORK CENTRAL

The Scenic Water Level Route

NEW YORK CENTRAL SYSTEM

Live the new... enjoy the old in San Antonio

Here is a rich heritage of romantic history . . . the famed Alamo, four ancient Missions and the Spanish Governors' Palace. Enjoy unusual parks . . . see great military establishments. Include San Antonio in your summer vacation trip. *On the Pan-American Highway to Old Mexico.*

San Antonio
WHERE CITIES DIFFERENT

MUNICIPAL INFORMATION BUREAU
706 Insurance Bldg., San Antonio, Tex

Name
Address
City State

Remove Damaging Moisture — Electrically!

No messy chemicals. No mess or fuss. Automatic protection for

- Game Rooms
- Libraries
- Workshops
- Laundry Rooms
- Storage Rooms

[illegible] drawing moisture from [illegible] [illegible] Illustrated [illegible] — Frigidaire Division of General Motors, 1422 Arbell St., Dayton 1, Ohio.

FRIGIDAIRE
Electric Dehumidifier

MINNESOTA
Land of 10,000 Lakes

"THE WHOLE FAMILY ENJOYED EVERY minute of our Minnesota vacation . . . gorgeous lakes, velvety golf courses, sandy beaches safe for the children, and hundreds of inexpensive family-style resorts. Minnesota means a PERFECT vacation!

says DICK METZ
Golf Champion of Atlantic City, N.J.

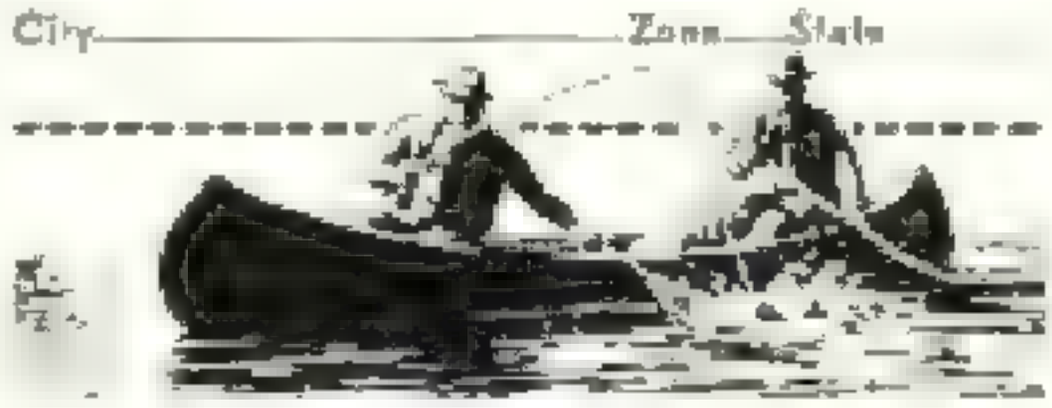
See Split Rock Lighthouse on the North Shore of Lake Superior—the area long [illegible] a Duluth—a world of beauty awaits you in Minnesota

GUIDE AND MAIL

TOURIST INFORMATION, DEPT. 241
State Capitol, St. Paul 1, Minnesota

Please send **FREE** color booklet "Marvelous Minnesota, Land of 10,000 Lakes."

Name (Print)
Address
City Zone State



CANCER

...a progress report

Medical Science is now waging its greatest fight against cancer

As the research attack on cancer progresses, discoveries are constantly being made that offer hope of further gains against the disease.

Today, *if diagnosed early and treated promptly and correctly*, authorities say that seventy-five per cent of cancers of the breast, eighty per cent of cancers of the mouth, and over ninety-five per cent of cancers of the skin are curable. Cancer of other parts of the body also is being treated with greater success.

Progress in new treatments

Doctors and other scientists are steadily working on the major aspects of cancer. At present, efforts are being made to perfect a simple, quick test to detect the disease early. One such test was recently announced. It is based upon the discovery that the blood serum of persons with cancer has different properties than that of normal persons.

Studies are carried along on the use of radioactive isotopes and drugs to combat cancer. Improvements in surgical techniques are also encouraging.

Your part in fighting cancer

In view of the progress being made by medical science, annual physical examinations are more important than ever in safeguarding against cancer, especially for those over thirty-five years of age.

Authorities urge everyone to learn the "danger signals" of cancer that are listed at the right. Fortunately, in the majority of cases, they turn out to be symptoms of conditions other than cancer.

There are still no "quick cures" for cancer. The only proved weapons which medical science now has against this disease are X-rays, radium, and surgery.

As medicine's knowledge of cancer increases, there is hope that the time may not be too far off when the disease will yield its secrets and thus cease to be a major threat to life. Meanwhile, with today's weapons—promptly and properly used—authorities predict that an ever increasing number of cancer victims may be saved.

The 7 "danger signals" that you should know

1. Any lump or thickening, especially in the breast, lip, or tongue.
2. Any irregular or unexplained bleeding.
3. A sore that does not heal, particularly about the mouth, tongue, or lips.
4. Noticeable changes in the color or size of a wart or mole.
5. Loss of appetite or continued indigestion.
6. Any persistent hoarseness, cough, or difficulty in swallowing.
7. Any persistent change in normal elimination.

Pain is not usually an early symptom of cancer

Metropolitan Life Insurance Company

1 Madison Ave., New York 10, N. Y.

Please send me a copy of your booklet, 04-N, "Learn Something YOU Can Do About Cancer."

Name _____

Street _____

City _____ State _____

Dr. Mann found cow barns hanging on a bush

Dr. William Mann first observed the [illegible] family life of the cure is [illegible] [illegible] explored the Batak [illegible] in 1941.

Small silk and leaf structures that the caterpillars had built on bushes near his tent were the trap-nests that the tachinid wasp laid its eggs in the [illegible] of these small, cocoon-selected leaf hoppers, which exuded a kind of nectar that the ants [illegible] were sheltering the hoppers, [illegible] milk cows, to furnish food for the ants.

But it was not until he located the ant [illegible] followed the trails leading from it that Dr. Mann discovered the actual cow barns for the [illegible] pampering leaf hoppers were [illegible].

Workers ants were carrying food [illegible] hatched larvae to the building site. There, the ant nurses set to work spinning the silk to make shelters for the family's milk cows.

It seemed to Dr. Mann that the ant [illegible] known as the [illegible] farm, could [illegible] trail quite fare if it to [illegible] certainly [illegible] football [illegible].

For [illegible] family man knows [illegible] problem is not to find work for [illegible] to be sure your youngsters are provided for until they're able to care [illegible].

And that problem can be made vastly easier for you by your Travelers agent or broker—a man it'll pay you to know.

With his expert guidance in the [illegible] your life insurance [illegible], you can [illegible] that your children will have a home to live in, food to eat, decent clothes to wear, and the [illegible] they need—even though you're no longer on hand to care for them.

— your Travelers man told...

MORALI INSURE IN

The Travelers

ALL FORMS OF INSURANCE AND SURETY BONDS

The Travelers Insurance Company, The Travelers Indemnity Company, The Travelers Fire Insurance Company, The Charter Oak Fire Insurance Company, Hartford 15, Connecticut. Serving the insurance public in the United States since 1864 and in Canada since 1865.


Coca-Cola
DRINK
Coca-Cola
Drive
Refreshed
Host of the highways
Refresh at the familiar red cooler on the road to anywhere.

Cine-Kodak Reliant Camera, f/2.7, with 38mm. telephoto and Combination Carrying Case

KODAK'S "Economy Eight" MOVIE MAKER

Cine-Kodak Reliant Camera—now with f/2.7 or f/1.9 lens

[illegible] wonderful little camera with which to [illegible] your movie diary!

[illegible] compact, so reasonable [illegible] And the [illegible] lenses. As for film expense, one roll of Kodachrome Film will pay you 30 or more [illegible] lenses—or the Reliant with the [illegible] f/1.9 lens. Either makes you an expert your [illegible]

"Know-how" is built into the camera! Loading's easy—there are no teeth to thread. [illegible] And [illegible]

See the Reliant at your dealer's [illegible] with f/1.9 lens...only $79 with f/2.7 [illegible] including Federal Tax. And many Kodak dealers [illegible]

Eastman Kodak Company
Rochester 4, N. Y.

Kodak

THIS YEAR...

Plan Your Vacation of-a-Lifetime IN MICHIGAN

WATER WONDERLAND

Michigan—Water Wonderland

Plan now your vacation in romantic Québec

LA PROVINCE DE

Québec

ROCKET 20"

Eclipse POWER MOWERS

The Best Value In Lawn Mowers for over 50 years

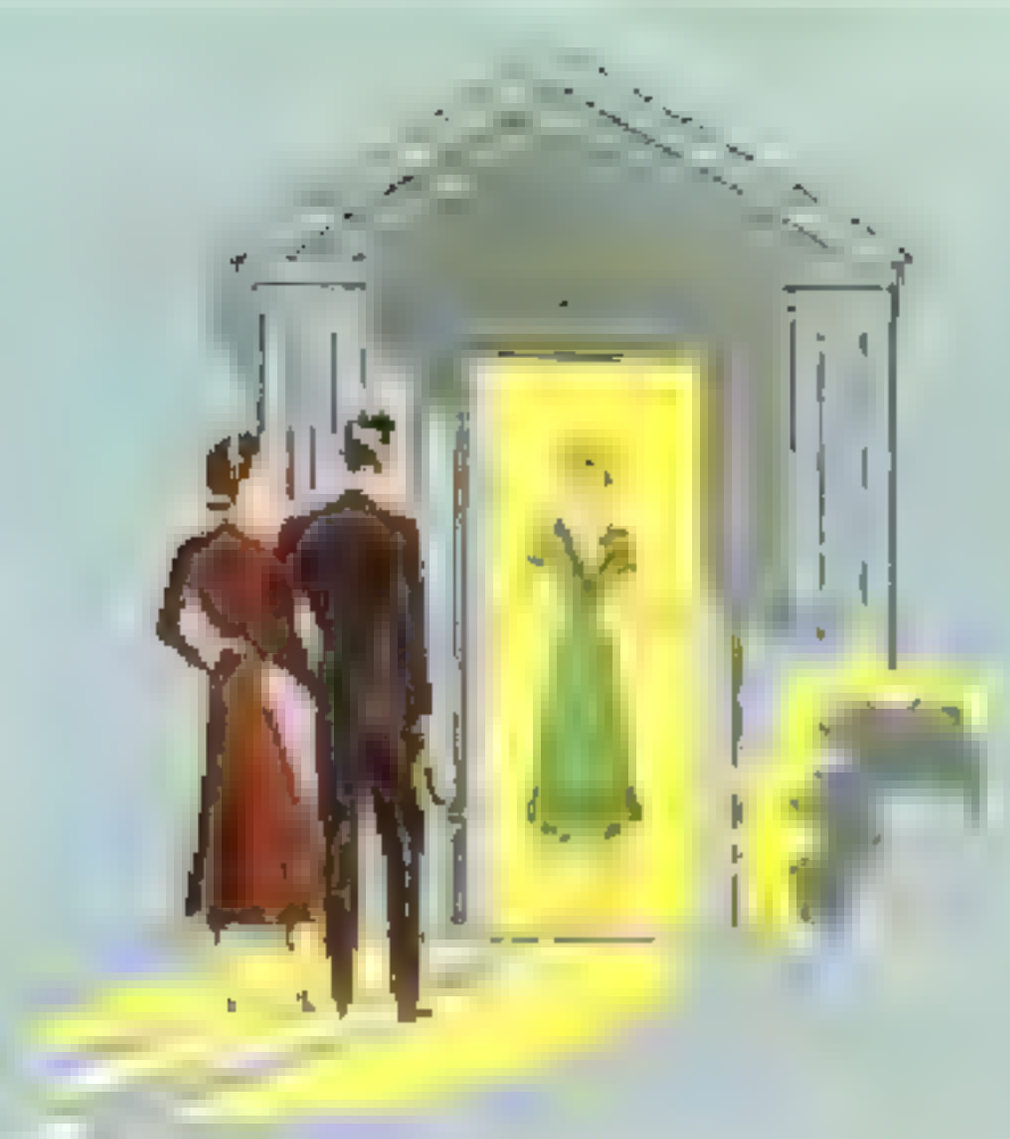
ONLY ECLIPSE OFFERS ALL OF THESE FEATURES

1
2
3
4
5
6
7
8
9
10
11
12
13

WRITE FOR THIS FREE BOOKLET

Eclipse

A COMPLETE LINE OF GAS AND POWER MOWERS



may be expressed in words, actions,
or the inviting interior of a home. In any event, we are
quite sure you will feel the glow of the welcome
awaiting you on the daily

"City of Los Angeles"...
"City of San Francisco"...
"City of Portland," all in
daily service between
Chicago and the West Coast
... Pullmans and reserved
coach seats.

Also in daily service:
"City of Denver" between
Chicago and Denver...,
"City of St. Louis" between
St. Louis and the West

Write Union Pacific Railroad,
Room 318, Omaha, Nebraska, for free
booklets, California and Pacific Northwest.

UNION PACIFIC RAILROAD

Dependable Passenger and Freight Transportation

FREE!

New 1950

VACATION GUIDE

to New York State

- **196-page, full-color book**
- **160 photos, maps, drawings**
- **Fully indexed for easy use**
- **Complete information on all 15 great vacation areas**

[illegible]

[illegible]

"NO LONGER NERVOUS!"

Switching to Famous Cereal Drink Brings Natural Relief

[illegible]

SCIENTIFIC FACTS: [illegible]

MAKE THIS TEST: [illegible] and Bran. A Product of General Foods

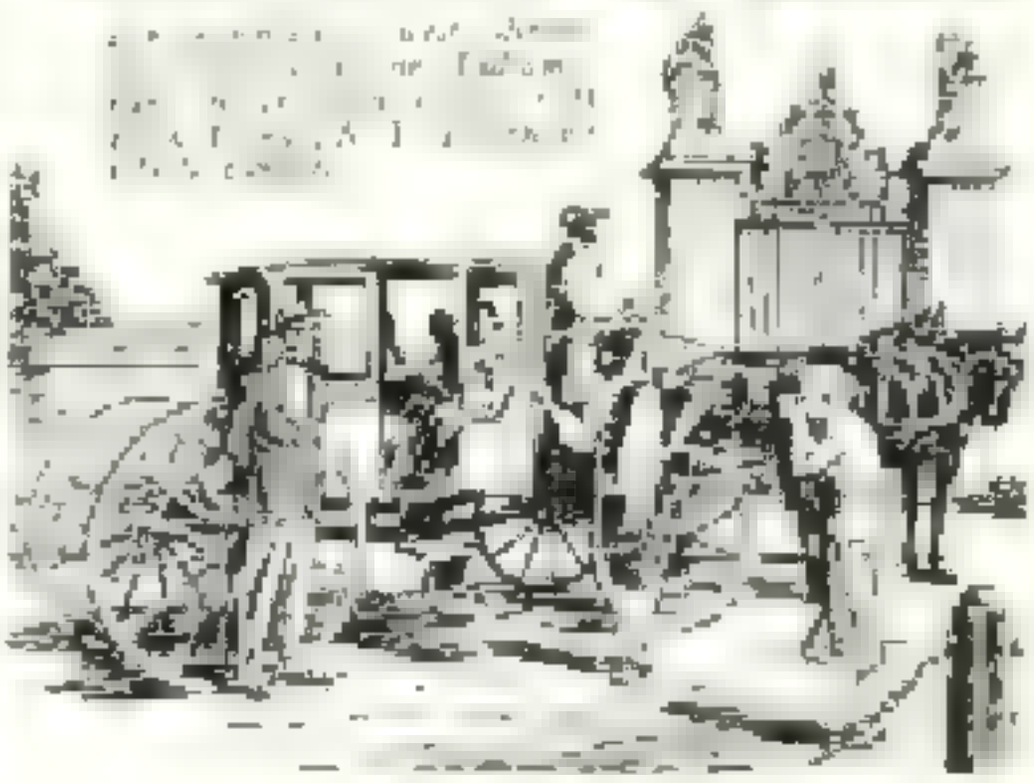
---

Welcome to historic **Williamsburg** *VIRGINIA*

Plan now to visit restored Williamsburg—where Washington, Jefferson and Patrick Henry championed our Freedom. You'll enjoy the leisurely tours of famous buildings and gardens—trips to Jamestown, Yorktown and nearby plantations. Also golf, tennis, sailing. Fine lodgings in modern hotels, colonial guest houses and restored taverns.

Williamsburg Lodge • Single from $[illegible] • [illegible]

Williamsburg Inn • Single from $[illegible] • [illegible]



[illegible]

Camps

ADMIRAL BILLARD ACADEMY

Box N, New London, Connecticut.

ADVENTURE TRAILS West, Canada, Alaska, Mexico, Europe.

Sita, 535 Fifth Avenue, New York 17

BURNHAM-BY-THE-SEA

Mrs. George W. Emerson, Box 43 N, Northampton, Massachusetts

CULVER SUMMER SCHOOLS
on Lake Maxinkuckee

40 Lake Shore Rd., Culver, Ind.

FARRAGUT NAVAL CAMPS

Farragut Naval Camps, Box LC, Toms River, N. J.

GAY VALLEY

Miss Mary W. Gayne, Director, Box N, Bernard, N. C.

CAMP LUPTON

The Director, Camp Lupton, Box N 55, Woodstock, Va.

OGONTZ

Abby A. Sutherland, Box 600, Ogontz School P. O., Pa.

PRAIRIE TREK EXPEDITION

Mary Meek, 304 Lay Rd., St. Louis 24, Mo.

SUSQUEHANNA

Robert T. Smith, New Milford, Pennsylvania.

WIHAKOWI

John K. Betts, Box G, Handsboro, Maryland.

Home Study

CALVERT "SCHOOL-AT-HOME"

Kindergarten through 9th grade. Soo

CALVERT SCHOOL
34 TUSCANY ROAD, BALTIMORE 10, MD

It's Fun Learning Languages by Linguaphone

LINGUAPHONE INSTITUTE
60 Radio City New York City

Coed Schools

BUXTON SCHOOL

Box 370-G, Williamstown, Massachusetts.

DEAN ACADEMY & JR. COLLEGE
COED 2 & 4 YR COURSES

ELGIN ACADEMY

E. P. Dreste, 117 Academy Place, Elgin, Ill.

OAKWOOD A FRIENDS SCHOOL

L. E. Shore, A. M., Principal, Box 10, Poughkeepsie, N. Y.

SOLEBURY SCHOOL

F. Dorick, Headmaster, Box N, New Hope, Pa.

Girls' Schools

CHEVY CHASE

Frances P. Brown, M.A., Pres., Box N 4410 Connecticut Ave., Washington 15, D. C.

EDGEWOOD PARK

Box N 10, Briarcliff Manor, New York

FAIRFAX HALL

Walter B. Gates, Pres., Box N 504, Park Station, Waynesboro, Virginia.

GREENBRIER COLLEGE

French W. Thompson, Pres., Box N 50, Lewisburg, West Virginia.

LASELL JUNIOR COLLEGE

Raymond C. Wass, 122 Woodland Rd., Auburndale 66, Mass.

LINDEN HALL

G. A. Harte, D.D., Box 64, Lititz, Pa.

OAK GROVE A FRIENDS SCHOOL FOR GIRLS

Mr. and Mrs. Gilbert Dean, Box 140, Vassalboro, Me.

SOUTHERN SEMINARY

Margaret Durham Boney, Pres., Box 204 N, Buena Vista, Va.

WALNUT HILL

Hester H. Davies, Principal, 80 Highland Street, Natick, Massachusetts

MARJORIE WEBSTER JUNIOR COLLEGE

Rock Creek Park Estates, Washington 12, D. C.

Colleges for Women

CHRISTIAN COLLEGE

James C. Miller, Ph.D., Pres., Box D, Columbia, Mo.

LINDENWOOD COLLEGE

F. L. Ma-Lure, Ph.D., Pres., Box 250, St. Charles, Mo.

MARYWOOD COLLEGE

Maywood College, Box E, Scranton, Penna.

Vocational

Bryant COLLEGE

CAMPUS TO CAREER
IN TWO YEARS
with a B.S. Degree

ENROLLMENT SECRETARY, PROVIDENCE 6, R. I.

FRANKLIN TECHNICAL INST.

33 Berkeley Street, Boston 16, Mass.

INDIANA TECHNICAL COLLEGE

140 E. Washington Blvd., Ft. Wayne 2, Indiana

KATHARINE GIBBS

Secretarial
Dept. 90 Marlborough St., Boston 16; 21 E. Superior St., Chicago 11; 230 Park Ave., New York 17; 155 Angell St., Providence 6.

NATIONAL COLLEGE OF EDUCATION

Box 047D, Evanston, Illinois.

WHY DON'T YOU WRITE?

Courses Approved for Veterans' Training
NEWSPAPER INSTITUTE OF AMERICA
Suite 5201, One Park Avenue, New York 16, N. Y.

TRI-STATE COLLEGE

Engr., Tech., Mech., Chem.

1416 College Ave., Angola, Ind.

Coed Colleges

COE COLLEGE

Registrar, Box 340, Cedar Rapids, Iowa

Colleges for Men

PENNSYLVANIA MILITARY COLLEGE

Dean of Adm., Dept. L, Chester, Pa.

Boys' Schools

AUGUSTA
- MILITARY
- ACADEMY
- FT. DEFIANCE
- VIRGINIA

"Take it to The Big Boy."

Col. Chas. S. Parker, Jr., Principal

THE BAYLOR SCHOOL

Accredited College Prep.

183 Chattanooga Road, Chattanooga, Tennessee

BLAIR ACADEMY

Benjamin D. Bunn, Box 17, Blairstown, New Jersey

BOLLES SCHOOL

Reg. Bolles School, Box 8037 M, Jacksonville, Florida

BORDENTOWN MILITARY

Registrar, Box 854, Bordentown, New Jersey

CASTLE HEIGHTS MILITARY Accredited

Col. R. N. Armstrong, Pres., Lebanon, Tenn. Near Nashville

CHAUNCY HALL SCHOOL

R. D. Farnsworth, 852 Boylston St., Boston, Massachusetts

COLUMBIA MILITARY ACADEMY

Dept. M, Columbia, Tennessee

CULVER MILITARY ACADEMY

On Lake Maxinkuckee

48 Pershing Rd., Culver, Indiana

DARLINGTON SCHOOL FOR BOYS

C. R. Wilson, Ph.D., Pres., Box M, Rome, Ga.

FARRAGUT

Adm. Farragut Academy, Box L, Toms River, N. J.

FISHBURNE MILITARY SCHOOL

Col. Morgan H. Hudgins, Box N, Waynesboro, Va.

FLORIDA MILITARY ACADEMY

Col. Walter B. Mendelle, President, Box 1, St. Petersburg, Florida

FORK UNION MILITARY ACADEMY

Dr. A. C. Wicker, Box 304, Fork Union, Va.

GEORGETOWN PREPARATORY SCHOOL

Rev. Wm. R. Maguire, S.J., Master, Garrett Park, Md.

GEORGIA MILITARY ACADEMY

Junior-Senior Military School

Col. W. N. Rhodes, Pres., College Park, Georgia.

GREENBRIER

MILITARY SCHOOL AND SUMMER CAMP

Colonel D. H. Barron, Superintendent, Box 5, Lewisburg, West Va.

HARGRAVE MILITARY ACADEMY

Pres., Box 304, Chatham, Virginia

HOWE MILITARY SCHOOL

S. H. Dadisman, 810 Academy Pl., Howe, Ind.

KEMPER MILITARY SCHOOL

Dir. of Adm., 1010 Third St., Boonville, Mo.

KENTUCKY MILITARY INSTITUTE

Col. C. R. Richmond, Pres., Box N, Lyndon, Ky.

LA SALLE MILITARY ACADEMY

Box G, Oakdale, Long Island, New York

MANLIUS

Registrar, Manlius School, Manlius, New York

MERCERSBURG ACADEMY

C. S. Tippetts, Box N, Mercersburg, Pa.

MISSOURI MILITARY ACADEMY AND JUNIOR SCHOOL

Col. C. R. Stribling, 880 Main St., Mexico, Mo.

MORGAN PARK MILITARY

Director of Admissions, Box 740, Morgan Park, Chicago 43, Ill.

NYMA

THE SCHOOL OF DISTINCTION

Est. 1889

Highest Rating Given

New York Military Academy, Cornwall-on-Hudson, New York

NORTHWESTERN MILITARY AND NAVAL ACADEMY

54 Lake Shore Rd., Lake Geneva, Wis.

OHIO MILITARY INSTITUTE

Col. A. W. Hendricks, Box N, College Hill, Cincinnati 24, Ohio

ONARGA MILITARY SCHOOL

Col. L. W. Billinger, Box W, Onarga, Illinois

EDUCATIONAL TROUBLE SHOOTERS

Individualized Plan
Each Student a Class

Our tests discover causes of difficulties

OXFORD ACADEMY

Box G-35, Passaic Park, N. J.

PEDDIE

C. C. Marang, Th.D., Box 4-N, Hightstown, New Jersey.

Peekskill MILITARY ACADEMY

HEADMASTER, BOX 306, PEEKSKILL, N. Y.

PENNSYLVANIA MILITARY PREPARATORY

C. W. Mott, Dept. B, Chester, Pennsylvania

PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO THE SECRETARY

Recommendation for Membership

IN THE

NATIONAL GEOGRAPHIC SOCIETY

** The Membership Dues, Which Are for the Calendar Year, Include Subscription to the National Geographic Magazine*

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington 6, D. C.: _____ *1950*

I nominate _____
PRINT NAME OF NOMINEE

Occupation _____
(This information is important for the records)

Address _____
PRINT ADDRESS OF NOMINEE

_____ *for membership in The Society.*

Name of nominating member _____
PLEASE PRINT

Address _____

* DUES: Annual membership in United States, $4.00; Canada, $5.00; abroad, $5.00. Life Membership, $100.00 U. S. funds. Remittances should be payable to National Geographic Society. Remittances from outside of continental United States and Canada should be made by New York draft or international money order.
4-50

LEROY A. WILSON
President of the American Telephone and Telegraph Co. Started as a traffic student in Indianapolis in 1922 at $120 a month.

ARLINGTON F. BROOKS
President of The Southern New England Telephone Co. Started as engineer's assistant in New Haven in 1911 at $12 a week.

VICTOR E. COSGLEY
President of the Southwestern Bell Telephone Co. Started as a clerk in San Francisco in 1911 at $60 a month.

HAL S. DUMAS
President of the Southern Bell Telephone and Telegraph Co. Started as a traffic student in Atlanta in 1911 at $60 a month.

RANDOLPH EDIE
President of The Ohio Bell Telephone Company. Started as a special engineer in New York City in 1911 at $15 a week.

WILFRED B. GILLEN
President of The Bell Telephone Company of Pennsylvania. Started as a clerk in Philadelphia in 1923 at $117 a month.

HARRY S. HANNA
President of the Indiana Bell Telephone Company. Started as an engineer in Cleveland in 1922 at $250 a month.

JOE E. HARRELL
President of the New England Telephone and Telegraph Company. Started as a clerk in Atlanta in 1913 at $14 a week.

WILLIAM A. HUGHES
President of the New Jersey Bell Telephone Co. Started as a ground man in Kansas City, Mo., in 1912 at $60 a month.

THOMAS N. LACY
President of the Michigan Bell Telephone Company. Started as an inspector in Philadelphia in 1905 at $10 a week.

E. RANDOLPH MADDOX
President of The Chesapeake & Potomac Telephone Co. Started as a student engineer in Washington in 1921 at $30 a week.

UP FROM THE RANKS

GRAHAM W. McCOURKLE
President of the Illinois Bell Telephone Company. Started as an office boy in Evansville, Ky., in 1902 at $20 a month.

KEITH S. McHUGH
President of the New York Telephone Company. Started as a clerk in New York City in 1919 at $35 a week.

EUGENE J. McNELLY
President of the Northwestern Bell Telephone Co. Started as student engineer in St. Louis in 1922 at $130 a month.

JAMES B. MORRISON
President of the Wisconsin Telephone Co. Started as engineering assistant in Washington, D. C., in 1925 at $120 a month.

FLOYD P. OGDEN
President of The Mountain States Telephone and Telegraph Co. Started as student and clerk in 1911 at $40 a month.

MARK H. SULLIVAN
President of The Pacific Telephone and Telegraph Company. Started as a clerk in San Francisco in 1912 at $50 a month.

THESE are presidents of operating telephone companies of the Bell System. They all started at the bottom of the ladder.

Twelve years ago the Bell System first published an advertisement like this, except that there are now sixteen new faces in the pictures.

The Bell System is an up-from-the-ranks business and it aims to keep the opportunity for advancement open to all. That has been true of the business for many years and nowhere is it better illustrated than in the careers of the men who now serve as presidents of Bell Telephone Companies throughout the country.

They have had wide telephone experience. Together they have put in 592 years of service, an average of 34 years each.

BELL TELEPHONE SYSTEM

2. A "second" watch has many uses—for work, sports and dress-up. Women's watches have many features formerly found only in men's watches, such as self-winding and split-timing mechanisms.

3. Power travels through lever. In quality movement (left), jewels insure accuracy, reduce friction as pin-lever can never do. *Don't be fooled by "bargains"—you usually get just about what you pay for!*

1. For a token of love on those special days, there is no gift like a fine watch—no gift in which style, sentiment and service are so blended. Today's new fashions in watches owe their beauty, versatility and value to Swiss leadership in developing the jeweled-lever movement. *It's the movement that counts—be sure your new watch has a quality Swiss jeweled-lever movement.*

She'll fall in love at first sight

4. Newest styles for men reflect Swiss craftsmanship. See water- and shock-resistant, calendar watches, automatics, chronographs, chronometers. *A smart Swiss watch is a treasure of lasting pride.*

5. This Swiss symbol tells you where your Swiss jeweled-lever watch can be serviced economically and promptly. And it identifies a jeweler who'll show you *the best Swiss watches in your price range.*

For the gifts you'll give with pride—let your jeweler be your guide

The WATCHMAKERS OF SWITZERLAND